

Sphere Rigidity - Progressive Research Companion

Progressive Research Companion | Presentation R1

Declaration Cards are in preparation. This document presents exact declaration nodes, source bindings, dependencies, levels, and Boundary Inputs. Project availability is recorded by the hosting release.

Mathematical scope

Finite-dimensional real normed spaces and surjective isometries between their unit spheres, with the theorem stated when at least one ambient space is finite-dimensional. The formalization includes radial extension, dimension transfer, determinant and Pluecker methods, analytic orientation tools, finite recovery, and ball-volume rigidity used in the proof architecture.

Principal result

If at least one of two real normed spaces is finite-dimensional, their unit spheres are isometric in the chord metric exactly when the ambient spaces are linearly isometric. Equivalently, a surjective unit-sphere isometry yields a linear isometry equivalence of the ambient spaces under that finite-dimensional hypothesis.

Exact source binding

Release: v0.2.0

Commit: 30963f26ac8ffa3dc3e9ec9de91fd0f9daf05305

Tree: b3378851a5287f5e3c8418f668e4d0ba52718739

Project entry: MathlibAnnex/Projects/SphereRigidity.lean

Direct root: MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity

Qualification run: 35086615666

Source and verification

The formal source is fixed to MathlibAnnex v0.2.0. Its recorded qualification covers the hosted build, root and Project-entry imports, compiled-axiom audit, source line-ending policy, and cleanliness checks. The declaration scope, source and toolchain bindings, dependency graph, levels, and Boundary Inputs are retained exactly. These structural records do not imply completed Declaration Cards, document correspondence, or a line-by-line human proof audit. Presentation changes do not alter the formal source.

Project architecture

R01 - Radial Extensions and Dimension

Radial extension of sphere isometries and transfer of finite-dimensional information. The route does not claim that the radial extension is linear or globally isometric; the recorded 3-Lipschitz bound is the source constant, not an optimality claim.

R02 - Compact Convex Hulls and Support Faces

Compact hulls, support faces, and finite lexicographic selection. The raw sets need not themselves be convex, nonemptiness is explicit, and finite-dimensional hypotheses appearing in the exact source are preserved.

R03 - Determinant Methods

Maximal-minor and determinant estimates with fixed row-order and sign conventions. Ordered row embeddings are not conflated with unordered row sets, and displayed bounds are not silently reinterpreted as Euclidean operator-norm statements.

R04 - Piola Identity and Null Lagrangians

Piola-type identities, null Lagrangians, determinant continuity, and boundary traces. The whole-space perturbation identity concerns the integral of the determinant difference; Strong L^n includes eventual integrability, and the trace used here is pointwise on the sphere.

R05 - Weak Gradient Zero and A.E. Constancy

Weak gradient zero implies local and global almost-everywhere constancy, not pointwise constancy. Compact C^1 test fields and divergence form the shared analytic base used by the orientation route.

R06 - Orientation and Signed Jacobians

Orientation and signed Jacobians on connected domains. No single global sign is asserted on a disconnected domain, and the null-image statement retained here is the same-dimension version present in the exact source.

R07 - Determinant-Maximizing Dual Frames

Determinant-maximizing dual frames and inverse bounds, including the zero-dimensional case. Mathlib providers are preferred for norming functionals; application-specific satellite-polynomial material remains provenance rather than a new public API claim.

R08 - Sphere-Volume Rigidity

Sphere-volume and ball-image rigidity. Compactness and inclusion in the relevant ball are explicit; equality of volume alone is not used to infer equality of sets without the separate inclusion hypothesis.

R09 - Determinant Factorization

A factorization route from proportional maximal minors, presented as a proof outline rather than an independently completed tool. Scale, sign, row order, and nondegeneracy conditions remain explicit to prevent degenerate overgeneralization.

Dependency and level summary

Level	Declarations
0	46
1	87
2	77
3	48
4	34
5	33
6	31
7	26
8	18
9	11
10	9
11	7
12	7
13	3
14	2
15	3
16	4
17	3
18	3
19	2
20	2
21	1
22	1
23	1
24	1
25	4
26	1
27	2

Selected declaration nodes: 467. Canonical reachability pairs: 10423. Display edges: 773. Maximum project-local level: 27. Cycles: 0.

Card coverage

All 467 entries are exact declarations. Declaration Cards are in preparation; public Card links are not active. Cards belong to exact declarations, not to Projects.

Boundary Inputs

Role	Count
Measure Theory	146
Normed Space Geometry	129
Continuous Linear Maps	75
Matrix Linear Algebra	48
Seminormed Geometry	46
Differential Calculus	42
Compactness Topology	36
Determinant Algebra	22
Convex Geometry	12
Isometry And Metric Geometry	11
Finite-dimensional Linear Algebra	9
Lipschitz Analysis	9
Sphere Geometry	2
Topological Equivalence	2
Integration	1
Volume And Measure	1

Dependency-first declaration route

Level 0

Declaration	Module / routes	Card state
MathlibAnnex.AEConstantOn	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.BilipschitzOrientation.BilipschitzOpenData	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Bas ic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.volume_image_eq_zero_of_lipschitzWith	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Bas ic Routes: -	In preparation
MathlibAnnex.CompactC1VectorField	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.DeterminantFrame.Frame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.NearMaxInverseBound	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateEquiv	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.functionalCoordinates	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.unitRowSet	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.FDeriv.norm_apply_le_seminorm_of_lipschitz	MathlibAnnex.Analysis.Calculus.FDeriv.SeminormBound Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.satelliteAmbientDim	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.LocalAEConstantAt	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.Matrix.MaximalMinorIndex	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.chartFactor	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.det_smul_vecMul_nonsingInv_eq_updateRowDet	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.exists_orderEmbedding_perm_of_injective	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.orientedMaximalMinor	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.rowL1Norm	MathlibAnnex.Analysis.Normed.Operator.Determinant Routes: R03	In preparation
MathlibAnnex.Matrix.submatrix_update_rowTuple	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.MeasureTheory.StrongLnOperatorField	MathlibAnnex.MeasureTheory.Integral.DeterminantContinuity Routes: R04	In preparation
MathlibAnnex.Mollification.lipschitz_fderiv_memLpOn_compact	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.Mollification.standardMollifier	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.maximizer	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.Piola.basisRow	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.coordinateDivergence	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.det_updateRow_finset_sum	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.Piola.exists_open_box_containing_compact	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.outputHybrid	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.sum_symmetric_mul_antisymmetric_eq_zero	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Satellite.FiniteCoefficientNet	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.SatelliteRows	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.abs_affine_endpoint_rigidity	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.coefficientAnnulus	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.SeminormBall.interior_sdiff_nonempty	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.SeminormBall.map_le	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.Sphere.isometryEquiv_of_linearIsometryEquiv	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation
MathlibAnnex.Sphere.normalizeToSphere	MathlibAnnex.Analysis.Normed.Sphere.Basic Routes: -	In preparation
MathlibAnnex.Sphere.scaled_normalize_dist_le_two	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.LocalBallData	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.compactLocalization	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.coordinate	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.divergence	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation
MathlibAnnex.isCompact_convexHull_pi	MathlibAnnex.Analysis.Convex.CompactHull Routes: R02	In preparation
MathlibAnnex.trace_smulRight	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation

Level 1

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.BilipschitzOpenData.f_injective	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.BilipschitzOpenData.lipschitz_f	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.BilipschitzOpenData.lipschitz_g	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.domainJacobianSign	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.fderiv_lower_bound	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.target_exceptional_null	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.carrier	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.contDiff	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.hasCompactSupport	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.ofSupport	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.ConstantRegion	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.DeterminantFrame.NearMaxInverseBound.K_n_onneg	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameCoordinates	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameMap	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameMatrix	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.functional_apply_eq_sum	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.inverseCoordinateMap	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.mem_unitRowSet	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.rawCoordinateRow	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.replaceRow	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.unitFrameSet	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.unitRowSet_isCompact	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm.IsContraction	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.LinearIsometryEquiv	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.Space	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBall	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.eq_zero_of_apply_eq_zero	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.EquivalentSeminorm.lipschitzWith_upper_of_model_bound	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Topology Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.ofContinuousLinearEquiv	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.unitSphere	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.FDeriv.ae_norm_apply_le_seminorm_of_lipschitz	MathlibAnnex.Analysis.Calculus.FDeriv.SeminormBound Routes: -	In preparation
MathlibAnnex.FiniteRecovery.AlmostIsometryMatch	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapBaseRow	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapSatelliteRow	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.FinMapAlmostIsometric	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.MaximalMinorIndex.ofOrderEmbedding	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.MaximalMinorIndex.orderedRows	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.OrientedMaximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.abs_det_le_prod_rowL1Norm	MathlibAnnex.Analysis.Normed.Operator.Determinant Routes: R03	In preparation
MathlibAnnex.Matrix.chartFactor_unique	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.orientedMaximalMinor_eq_zero_of_not_injective	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.orientedMaximalMinor_permute	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.selectedSubmatrix_mul_chartFactor	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Mollification.mollify	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.Mollification.standardMollifier_continuous	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.Mollification.standardMollifier_hasCompactSupport	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.le_maximizer	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NonemptyCompacts.maxValue	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NonemptyCompacts.maximizer_mem	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NormBall.map_le	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.Piola.basisRow_apply	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.cofactorRow	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.coordinateDivergence_eq_zero_of_not_mem_tsupport	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.hessianCoordinate	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.outputHybrid_empty	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.outputHybrid_univ	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.Piola.singleOutputPerturb	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.sum_smul_basisRow	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.twoRowReplacement	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.PluckerRecovery.LimitCertificate	MathlibAnnex.Analysis.Normed.Plucker.LimitRecovery Routes: -	In preparation
MathlibAnnex.PluckerRecovery.LinearCertificate	MathlibAnnex.Analysis.Normed.Plucker.RecoveryCertificate Routes: -	In preparation
MathlibAnnex.Satellite.SatelliteConfiguration	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.abs_eval_lower_of_norms_nearby	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.satelliteRowsSet	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.SeminormBall.map_eq	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.SeminormBall.measure_It	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.Sphere.coe_normalizeToSphere	MathlibAnnex.Analysis.Normed.Sphere.Basic Routes: -	In preparation
MathlibAnnex.Sphere.normalizeToSphere_pos_smul	MathlibAnnex.Analysis.Normed.Sphere.Basic Routes: -	In preparation
MathlibAnnex.Sphere.normalizeToSphere_unit	MathlibAnnex.Analysis.Normed.Sphere.Basic Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.LocalBallData.carrier	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.inner	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.middle	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.compactLocalization_of_mem	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.compactLocalization_of_not_mem	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.exists_localBallData	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localMollification	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.normalizedShrinkingBump	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump_rIn	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump_rOut	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump_rOut_le_half	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump_rOut_tendsto_zero	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.aeConstantOn_of_countableCover	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.aeConstants_eq_of_open_overlap	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.allCoordinates	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.divergence_pi	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation
MathlibAnnex.divergence_sub_smul	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation

Level 2

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.abs_domainJacobianSign	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.fderiv_injective	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.targetJacobianSign	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.carrier_compact	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.carrier_ofSupport	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.continuous	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.ofSupport_apply	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.support_subset	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.tsupport_subset	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.abs_det_sub_le_max	MathlibAnnex.Analysis.Normed.Operator.Determinant Routes: R03	In preparation
MathlibAnnex.ContinuousLinearMap.selectedOutputLinearMap	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.DeterminantFrame.coordinateRowSize	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameCoordinates_eq_mulVec	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameDeterminant	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameMatrix_replaceRow	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.mem_unitFrameSet	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.replaceRow_mem_unitFrameSet	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.unitFrameSet_isCompact	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBallVolume	MathlibAnnex.MeasureTheory.Measure.EquivalentSeminormBall Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.contractionSet	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.dist_space_eq	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.mem_closedUnitBall	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.mem_unitSphere	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.norm_space_eq	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.ofContinuousLinearEquivalence_apply	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.ofReference_toReference	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.sphere_apply	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.EquivalentSeminorm.toReference_ofReference	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.toReference_sub	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.toReference_sub_ofReference	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.toReference_zero	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.zero_isContraction	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.zero_mem_closedUnitBall	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapConfiguration	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.FinMapAlmostIsometric.lower_of_ne_zero	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.configurationMap	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.MaximalMinorIndex.orderedRows_ofOrderEmbedding	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.det_chartFactor	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.maximalSubmatrix	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.rowCoordinates_eq_of_orientedMaximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.scale_eq_one_of_orientedMaximalMinorsProportional_zero	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Mollification.eventually_tsupport_mollify_subsets_compact	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.Mollification.mollify_add	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.Mollification.mollify_contDiff	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.maxSlice	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NormBall.map_eq	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.NormBall.measure_It	MathlibAnnex.Analysis.Normed.Ball.VolumeRigidity Routes: R08	In preparation
MathlibAnnex.Piola.cofactorRowField	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.det_twoRowReplacement_swap	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.det_updateRow_eq_sum_mul_cofactorRow	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.hessianCoordinate_comm	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.integral_coordinateDivergence_eq_zero_of_contDiff_hasCompactSupport	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.outputHybrid_insert_eq_singleOutputPerturb	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.PluckerRecovery.LinearCertificate.modelNorm_le_two	MathlibAnnex.Analysis.Normed.Plucker.RecoveryCertificate Routes: -	In preparation
MathlibAnnex.PluckerSupport.satellitePluckerCoefficients	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.Satellite.frameCoordinates_norm_le_model	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.satelliteConfigurationSet	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension_of_ne_zero	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtension_zero	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakDivergenceZero	MathlibAnnex.Analysis.Distribution.WeakGradient.Basic Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.carrier_isCompact	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.carrier_measurable	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.carrier_subset	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.center_mem_inner	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.inner_isOpen	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.inner_subset_carrier	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.middle_subset_carrier	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.translated_closed_Ball_subset_middle	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localMollification_fderiv_apply	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.shrinkingBump_ratio	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.translatedBumpField	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.aeConstantOn_of_everywhere_local	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.constantRegion_compl_isOpen	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.constantRegion_isOpen	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.coordinate_mem_allCoordinates	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.le_maxValue_of_mem_convexHull	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.supportFace	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 3

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.abs_targetJacobianSign	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.det_fderiv_ne_zero	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.fderiv_eq_zero_of_not_mem_carrier	MathlibAnnex.Analysis.Distribution.TestField Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.abs_det_sub_le	MathlibAnnex.Analysis.Normed.Operator.Determinant Routes: R03	In preparation
MathlibAnnex.ContinuousLinearMap.norm_selectedOutputLinearMap_le	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.DeterminantFrame.coordinateRowSize_nonneg	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateScale	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameDeterminant_continuous	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.norm_rawCoordinateRow_le_size	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.replacementDeterminant	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.unitFrameSet_nonempty	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBall_isBounded	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Topology Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBall_nonempty	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.mem_contractionSet	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.transportLinearIsometryEquiv	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.unitSphereEquiv	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.zero_mem_interior_closedUnitBall	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Topology Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapConfiguration_base_apply	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapConfiguration_mem	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapConfiguration_satellite_apply	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.configurationMap_norm_gt_of_satellite	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.configurationMap_norm_le_model	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.isUnit_chartFactor_of_scale_ne_zero	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.maximalMinor	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalSubmatrix_mul	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalSubmatrix_mulVec	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalSubmatrix_ofOrderEmbedding	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.Matrix.maximalSubmatrix_zero	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.mul_chartFactor_eq_of_orientedMaximaIMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Mollification.eventually_mollify_fderiv_memLpOn_compact	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.maxSlice_isCompact	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NonemptyCompacts.maximizer_mem_maxSlice	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.Piola.componentFlux	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.sum_hessian_twoRowReplacement_eq_zero	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.PluckerRecovery.LinearCertificate.referenceNorm_le	MathlibAnnex.Analysis.Normed.Plucker.RecoveryCertificate Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension_norm	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtension_on_sphere	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.LocalBallData.inner_nonempty	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.LocalBallData.middle_subset_open	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.compactLocalization_eq_ae_inner	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.divergence_translatedBumpField	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.integrableOn_localBallCarrier	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localMollification_tendsto_ae	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.allCoordinates_separate	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.constantRegion_eq_of_preconnected	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation
MathlibAnnex.convexHull_maxSlice_eq_supportFace	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.maxValue_eq_of_convexHull_eq	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 4

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.det_eq_domainSign_mul_abs	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.targetJacobianSign_const_is_pm_one	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Constancy Routes: -	In preparation
MathlibAnnex.BilipschitzOrientation.targetJacobianSign_locallyIntegrableOn	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Constancy Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.divergence_eq_zero_of_not_mem_carrier	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.norm_det_sub_le	MathlibAnnex.Analysis.Normed.Operator.Determinant Routes: R03	In preparation
MathlibAnnex.ContinuousLinearMap.selectedOutput	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.DeterminantFrame.coordinateRow	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateScale_pos	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.exists_maximizingFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.replacementDeterminant_eq_cramerTranspose	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBall_isCompact	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Topology Routes: -	In preparation
MathlibAnnex.EquivalentSeminorm.spherelsometryEquiv	MathlibAnnex.Analysis.Normed.Module.EquivalentSeminorm.Transport Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap_apply_base	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap_apply_satellite	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap_finMapConfiguration	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap_norm	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.MaximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.existsUnique_factor_of_orientedMaximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.maximalMinor_mul	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinor_ofOrderEmbedding	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinor_zero_of_pos	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinors	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.mulVec_injective_of_maximalMinor_ne_zero	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Mollification.tendsto_eLpNorm_fderiv_mollify_sub	MathlibAnnex.Analysis.Calculus.Mollification Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.maxSlice_nonempty	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.Piola.sum_hessianCoordinate_twoRowReplacement_eq_zero	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.support_componentFlux_subset	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Satellite.satellitePolynomial	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension_leftInverse	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.radialExtension_lipschitz	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.compactLocalization_integrable	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localBall_inner_measure_pos	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.translatedBumpField_carrier_subset	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.exists_aeConstantOn_of_local	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation

Level 5

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.signed_area_transfer	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Basic Routes: -	In preparation
MathlibAnnex.CompactC1VectorField.support_divergence_subset	MathlibAnnex.Analysis.Distribution.Divergence Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.norm_selectedOutput_image_one	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.selectedOutput_apply	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.selectedSquare	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.selectedSquareCLM	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.DeterminantFrame.coordinateFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateRow_apply	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.cramerReplacement	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameMap_injective_of_det_ne_zero	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.maximizingFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.EquivalentSeminorm.closedUnitBallVolume_pos	MathlibAnnex.MeasureTheory.Measure.EquivalentSeminormBall Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configurationFinMap_norm_image_model	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.finMapConfiguration_configurationFinMap	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.ballVolumeScaledMaximalMinors	MathlibAnnex.LinearAlgebra.Matrix.VolumeScaledMaximalMinor Routes: -	In preparation
MathlibAnnex.Matrix.maximalMinors_continuous	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinors_mul	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinors_smul	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.maximalMinors_zero_of_pos	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinor Routes: R03	In preparation
MathlibAnnex.Matrix.orientedMaximalMinor_eq_of_orderEmbedding	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.MeasureTheory.tendsto_integral_det_of_strongLn	MathlibAnnex.MeasureTheory.Integral.DeterminantContinuity Routes: R04	In preparation
MathlibAnnex.NonemptyCompacts.refine	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NullLagrangian.selectedOutput_hasCompactSupport	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Piola.componentFlux_hasCompactSupport	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Piola.piola_divergence_eq_zero_of_expansion	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.PluckerRecovery.LimitCertificate.measure_image_unitBall_eq	MathlibAnnex.Analysis.Normed.Plucker.LimitRecovery Routes: -	In preparation
MathlibAnnex.Satellite.configurationPolynomial	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension_image_ball	MathlibAnnex.Analysis.Normed.Sphere.RadialBall Routes: -	In preparation
MathlibAnnex.Sphere.radialExtension_rightInverse	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtension_symm_lipschitz	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.WeakGradient.compactLocalization_locallyIntegrable	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.weakIntegral_eq_localized_bumpIntegral	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.exists_aeConstantOn_of_local_preconnected	MathlibAnnex.MeasureTheory.Function.AEConstant Routes: R05	In preparation

Level 6

Declaration	Module / routes	Card state
MathlibAnnex.ContinuousLinearMap.det_selectedSquare	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.norm_selectedSquare_le	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.selectedSquareCLM_apply	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.ContinuousLinearMap.selectedSquare_sub	MathlibAnnex.Analysis.Normed.Operator.SelectedMinor Routes: -	In preparation
MathlibAnnex.DeterminantFrame.abs_frameDeterminant_le_maximizingFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateFrame_mem	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.determinantMaximum	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameMatrix_coordinateFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.maximizingFrame_mem	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.FiniteRecovery.PluckerGeneratorGood	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.FiniteSup.Bridge.configuration_contraction_iff	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Matrix.ballVolumeScaledMaximalMinors_continuous	MathlibAnnex.LinearAlgebra.Matrix.VolumeScaledMaximalMinor Routes: -	In preparation
MathlibAnnex.Matrix.ballVolumeScaledMaximalMinors_zero_of_pos	MathlibAnnex.LinearAlgebra.Matrix.VolumeScaledMaximalMinor Routes: -	In preparation
MathlibAnnex.Matrix.orientedMaximalMinorsProportional_of_maximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.Matrix.pairing_ballVolumeScaledMaximalMinors	MathlibAnnex.LinearAlgebra.Matrix.VolumeScaledMaximalMinor Routes: -	In preparation
MathlibAnnex.NonemptyCompacts.mem_refine	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.NullLagrangian.maximalMinorIntegrand	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Piola.divergence_cofactorRowField_eq_zero	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Plucker.derivativeGenerator	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.PluckerBody.generators	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerRecovery.LimitCertificate.image_unitBall_eq	MathlibAnnex.Analysis.Normed.Plucker.LimitRecovery Routes: -	In preparation
MathlibAnnex.PluckerSupport.orientedSatelliteSupport	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation
MathlibAnnex.PluckerSupport.pluckerPairing_satelliteCoefficients_maximalMinors	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation
MathlibAnnex.Satellite.maxSatelliteConfiguration	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.radialExtensionEquiv	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtension_surjective	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.exists_inner_convergencePoint	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localMollification_contDiff	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.WeakGradient.localMollification_fderiv_apply_eq_zero	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.lexicographicRefine	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Declaration	Module / routes	Card state
MathlibAnnex.refine_convexHull_eq	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 7

Declaration	Module / routes	Card state
MathlibAnnex.DeterminantFrame.abs_replacementDeterminant_le_maximum	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.coordinateInverseFactor	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.frameDeterminant_coordinateFrame	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrames	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.Matrix.mul_chartFactor_eq_of_maximalMinorsProportional	MathlibAnnex.LinearAlgebra.Matrix.MaximalMinorFactorization Routes: R09	In preparation
MathlibAnnex.NullLagrangian.integrableOn_maximalMinor_fderiv_of_lipschitzWith	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.NullLagrangian.maximalMinorIntegrand_mollify_continuous	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.NullLagrangian.tendsto_integral_maximalMinor_mollify	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.NullLagrangian.topMinor_difference_eq_zero_of_not_mem_tsupport	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Piola.divergence_componentFlux_eq_det_sub	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Plucker.derivativeAverage	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.Plucker.derivativeGenerator_comp_linear_apply	MathlibAnnex.Analysis.Normed.Plucker.RadialAverage Routes: -	In preparation
MathlibAnnex.Plucker.derivativeGenerator_integrableOn_compact	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.Plucker.derivativeGenerator_mem_raw	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.PluckerBody.body	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerBody.generators_eq_image_union	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerBody.generators_neg	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerBody.generators_nonempty	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerSupport.pluckerFunctional_normalized_configurationFinMap	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation
MathlibAnnex.Satellite.CoefficientDetectsUnit	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.satelliteBudget	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.finrank_eq	MathlibAnnex.Analysis.Normed.Sphere.Dimension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtensionHomeomorph	MathlibAnnex.Analysis.Normed.Sphere.RadialExtension Routes: R01	In preparation
MathlibAnnex.WeakGradient.localMollification_fderiv_eq_zero	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.lexicographicRefine_convexHull_eq	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation
MathlibAnnex.lexicographicRefine_subset	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 8

Declaration	Module / routes	Card state
MathlibAnnex.DeterminantFrame.NearMaxInverseBound.bound_sub	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.abs_cramerNumerator_le	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.determinantMaximum_pos	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.inverseBoundConstant	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrame_abs_det_lower	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrames_isCompact	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrames_nonempty	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.NullLagrangian.integral_topMinor_difference_eq_setIntegral	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Piola.integral_det_singleOutputPerturb_sub_eq_zero	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Plucker.derivativeAverage_comp_linear_radial_apply	MathlibAnnex.Analysis.Normed.Plucker.RadialAverage Routes: -	In preparation
MathlibAnnex.PluckerBody.body_neg	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerBody.generators_isCompact	MathlibAnnex.Analysis.Convex.PluckerBody Routes: -	In preparation
MathlibAnnex.PluckerSupport.orientedSatelliteSupport_configuration	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation
MathlibAnnex.Satellite.abs_satelliteTerms_le_budget	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.finiteDimensional_codomain	MathlibAnnex.Analysis.Normed.Sphere.Dimension Routes: R01	In preparation
MathlibAnnex.Sphere.radialExtension_integral_abs_det	MathlibAnnex.Analysis.Normed.Sphere.RadialJacobian Routes: -	In preparation
MathlibAnnex.WeakGradient.exists_localMollification_constant	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.lexicographicRefine_agreesOn	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 9

Declaration	Module / routes	Card state
MathlibAnnex.DeterminantFrame.inverseBoundConstant_pos	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrame_det_ne_zero	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.Piola.integral_det_fderiv_add_sub_eq_zero_of_contDiff	MathlibAnnex.Analysis.Calculus.Piola Routes: R04	In preparation
MathlibAnnex.Plucker.derivativeAverage_mem_body	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.Plucker.derivativeGenerator_integrable_of_seminormLipschitz	MathlibAnnex.Analysis.Normed.Plucker.Average Routes: -	In preparation
MathlibAnnex.PluckerSupport.orientedSatelliteSupport_self	MathlibAnnex.Analysis.Normed.Operator.PluckerSupport Routes: -	In preparation
MathlibAnnex.Satellite.abs_satellitePolynomial_le	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.exists_weight_dominating_budget	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Sphere.finiteDimensional_domain	MathlibAnnex.Analysis.Normed.Sphere.Dimension Routes: R01	In preparation
MathlibAnnex.WeakGradient.localMollification_eq_at_inner_points	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.lexicographicRefine_subsingleton	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 10

Declaration	Module / routes	Card state
MathlibAnnex.DeterminantFrame.abs_inverse_mulVec_apply_le	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.nearMaxFrame_det_isUnit	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.FiniteRecovery.rawOrientedSupportMaximizer_isAbsolutePolynomialMaximizer	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.NullLagrangian.integral_maximalMinor_fderiv_add_sub_eq_zero_of_contDiff	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Plucker.exists_extension_with_derivativeAverage_mem	MathlibAnnex.Analysis.Normed.Plucker.BoundaryExtension Routes: -	In preparation
MathlibAnnex.Satellite.absoluteMaximizer_satellite_norms_preimage	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.base_mem_nearMax_of_benchmark_le	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakGradient.compactLocalization_aeConstant_inner	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.exists_common_of_convexHull_eq	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 11

Declaration	Module / routes	Card state
MathlibAnnex.DeterminantFrame.inverseBoundConstant_bound	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.DeterminantFrame.inverse_mulVec_frameCoordinates	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.NullLagrangian.integral_maximalMinor_fderiv_add_sub_eq_zero_of_lipschitzWith	MathlibAnnex.MeasureTheory.Integral.MaximalMinor Routes: -	In preparation
MathlibAnnex.Satellite.absoluteMaximizer_base_nearMax	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.absoluteMaximizer_satellites_almost_norm	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakGradient.exists_aeConstant_inner	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation
MathlibAnnex.exists_common_pi	MathlibAnnex.Analysis.Convex.LexicographicSelection Routes: R02	In preparation

Level 12

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.weak_piola	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Piola Routes: -	In preparation
MathlibAnnex.DeterminantFrame.exists_nearMaxInverseBound	MathlibAnnex.Analysis.Normed.Dual.DeterminantFrame Routes: R07	In preparation
MathlibAnnex.NullLagrangian.integral_maximalMinor_eq_of_pointwise_boundary_eq	MathlibAnnex.MeasureTheory.Integral.MaximalMinorBoundary Routes: -	In preparation
MathlibAnnex.Satellite.absoluteMaximizer_satellites_one_sub_epsilon	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.frameCoordinates_mem_coefficientAnnulus	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.Satellite.modelDist_framePreimage_le	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakGradient.exists_localAECostantAt	MathlibAnnex.Analysis.Distribution.WeakGradient.Local Routes: -	In preparation

Level 13

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.targetJacobianSign_weakDivergenceZero	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Piola Routes: -	In preparation
MathlibAnnex.Satellite.exists_net_preimage_close	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakDivergenceZero.locally_aeConstant	MathlibAnnex.Analysis.Distribution.WeakGradient Routes: R05	In preparation

Level 14

Declaration	Module / routes	Card state
MathlibAnnex.Satellite.finiteCoefficientNet_detectsUnit	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakDivergenceZero.exists_aeConstantOn	MathlibAnnex.Analysis.Distribution.WeakGradient Routes: R05	In preparation

Level 15

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.targetJacobianSign_ae_constant	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Constancy Routes: -	In preparation
MathlibAnnex.Satellite.finiteNet_absoluteMaximizer_satellites_one_sub_epsilon	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation
MathlibAnnex.WeakDivergenceZero.exists_eqOn	MathlibAnnex.Analysis.Distribution.WeakGradient Routes: R05	In preparation

Level 16

Declaration	Module / routes	Card state
MathlibAnnex.BilipschitzOrientation.integral_det_fderiv_eq_singned_volume	MathlibAnnex.Analysis.Calculus.BilipschitzOrientation.Constancy Routes: -	In preparation
MathlibAnnex.FiniteRecovery.targetRawSupportMaximizer_good	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.FiniteSup.maxNetConfigurationMap_lower_of_ne_zero	MathlibAnnex.Analysis.Normed.Operator.FiniteSup Routes: -	In preparation
MathlibAnnex.Satellite.exists_goodNetSatelliteMaximizer	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation

Level 17

Declaration	Module / routes	Card state
MathlibAnnex.FiniteRecovery.exists_almostIsometryMatch_at_satelliteDimension	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.Plucker.derivativeAverage_comp_linear_radial	MathlibAnnex.Analysis.Normed.Plucker.RadialAverage Routes: -	In preparation
MathlibAnnex.Satellite.exists_goodSatellitePackage	MathlibAnnex.Analysis.Normed.Dual.Satellite Routes: -	In preparation

Level 18

Declaration	Module / routes	Card state
MathlibAnnex.FiniteRecovery.exists_almostIsometryMatch_of_all_body_eq	MathlibAnnex.Analysis.Normed.Operator.FiniteRecovery Routes: -	In preparation
MathlibAnnex.PluckerBody.normalizedGenerator_mem_of_spherelsometry	MathlibAnnex.Analysis.Normed.Plucker.BodyInvariance Routes: -	In preparation
MathlibAnnex.PluckerRecovery.exists_linearCertificate_of_pluckerBodies_eq	MathlibAnnex.Analysis.Normed.Plucker.RecoveryCertificate Routes: -	In preparation

Level 19

Declaration	Module / routes	Card state
MathlibAnnex.PluckerBody.rawGenerators_subset_of_spherelsometry	MathlibAnnex.Analysis.Normed.Plucker.BodyInvariance Routes: -	In preparation
MathlibAnnex.PluckerRecovery.exists_limitCertificate_of_pluckerBodies_eq	MathlibAnnex.Analysis.Normed.Plucker.LimitRecovery Routes: -	In preparation

Level 20

Declaration	Module / routes	Card state
MathlibAnnex.EquivalentSeminorm.exists_linearsometryEquiv_of_pluckerBodies_eq	MathlibAnnex.Analysis.Normed.Plucker.ModelRigidity Routes: -	In preparation
MathlibAnnex.PluckerBody.subset_of_spherelsometry	MathlibAnnex.Analysis.Normed.Plucker.BodyInvariance Routes: -	In preparation

Level 21

Declaration	Module / routes	Card state
MathlibAnnex.PluckerBody.eq_of_spherelsometry	MathlibAnnex.Analysis.Normed.Plucker.BodyInvariance Routes: -	In preparation

Level 22

Declaration	Module / routes	Card state
MathlibAnnex.EquivalentSeminorm.linearsometryEquiv_of_spherelsometryEquiv	MathlibAnnex.Analysis.Normed.Plucker.ModelRigidity Routes: -	In preparation

Level 23

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.linearsometryEquiv_of_coordinate_model	MathlibAnnex.Analysis.Normed.Sphere.ModelTransport Routes: -	In preparation

Level 24

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.linearsometryEquiv_of_isometryEquiv_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation

Level 25

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.linearsometryEquiv_of_isometryEquiv_finiteDimensional_codomain	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation
MathlibAnnex.Sphere.linearsometryEquiv_of_isometryEquiv_finiteDimensional_domain	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation
MathlibAnnex.Sphere.linearsometryEquiv_of_isometry_surjective_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation
MathlibAnnex.Sphere.nonempty_isometryEquiv_iff_nonempty_linearsometryEquiv_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation

Level 26

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.linearsometryEquiv_of_isometryEquiv_of_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation

Level 27

Declaration	Module / routes	Card state
MathlibAnnex.Sphere.linearIsometryEquiv_of_isometry_surjective_of_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation
MathlibAnnex.Sphere.nonempty_isometryEquiv_iff_nonempty_linearIsometryEquiv_of_finiteDimensional	MathlibAnnex.Analysis.Normed.Sphere.MetricRigidity Routes: -	In preparation

Curated Boundary Input inventory

The following entries are external provider declarations selected for their mathematical role. They are boundary records, not project-local level nodes.

Provider declaration	Role / routes
ConditionallyCompleteLinearOrder.toCompactIccSpace	Compactness Topology R04
ContDiffMapSupportedIn.hasCompactSupport	Compactness Topology -
Continuous.integrable_of_hasCompactSupport	Compactness Topology R04
ContinuousOn.integrableOn_compact	Compactness Topology -
HasCompactSupport	Compactness Topology R04
HasCompactSupport.contDiff_convolution_left	Compactness Topology -
HasCompactSupport.convolutionExists_left	Compactness Topology -
HasCompactSupport.isCompact	Compactness Topology R04
Homeomorph.locallyCompactSpace_iff	Compactness Topology R01
IsCompact	Compactness Topology R02, R04, R07, R08
IsCompact.exists_isMaxOn	Compactness Topology R02, R07
IsCompact.image	Compactness Topology -
IsCompact.inter_right	Compactness Topology R02, R07
IsCompact.isBounded	Compactness Topology R04
IsCompact.isClosed	Compactness Topology R08
IsCompact.measurableSet	Compactness Topology R08
IsCompact.of_isClosed_subset	Compactness Topology R04
IsCompact.union	Compactness Topology -
LocallyCompactSpace	Compactness Topology R01
Metric.isCompact_of_isClosed_isBounded	Compactness Topology -
Pi.compact_licc_space'	Compactness Topology R04
ProperSpace.isCompact_closedBall	Compactness Topology R07
SeparableWeaklyLocallyCompactAddGroup.sigmaCompactSpace	Compactness Topology R04
TopologicalSpace.Compacts	Compactness Topology -
TopologicalSpace.Compacts.instSetLike	Compactness Topology -
TopologicalSpace.Compacts.isCompact	Compactness Topology -
TopologicalSpace.Compacts.mk	Compactness Topology R02
TopologicalSpace.NonemptyCompacts	Compactness Topology R02
TopologicalSpace.NonemptyCompacts.instSetLike	Compactness Topology R02
TopologicalSpace.NonemptyCompacts.isCompact	Compactness Topology R02

Provider declaration	Role / routes
TopologicalSpace.NonemptyCompacts.mk	Compactness Topology R02
TopologicalSpace.NonemptyCompacts.nonempty	Compactness Topology R02
instWeaklyLocallyCompactSpaceOfLocallyCompactSpace	Compactness Topology R01, R04
isCompact_iUnion	Compactness Topology R02
isCompact_univ_pi	Compactness Topology R07
locallyCompact_of_proper	Compactness Topology R01, R04, R07
ContinuousLinearEquiv	Continuous Linear Maps R07
ContinuousLinearEquiv.apply_symm_apply	Continuous Linear Maps R07
ContinuousLinearEquiv.equivLike	Continuous Linear Maps R07
ContinuousLinearEquiv.injective	Continuous Linear Maps R07
ContinuousLinearEquiv.symm	Continuous Linear Maps R07
ContinuousLinearEquiv.symm_apply_apply	Continuous Linear Maps R07
ContinuousLinearEquiv.toContinuousLinearMap	Continuous Linear Maps R07
ContinuousLinearEquiv.toLinearEquiv	Continuous Linear Maps -
ContinuousLinearMap	Continuous Linear Maps R02, R03, R04, R07
ContinuousLinearMap.add	Continuous Linear Maps R04
ContinuousLinearMap.addCommGroup	Continuous Linear Maps R04, R07
ContinuousLinearMap.addCommGroup._proof_6	Continuous Linear Maps R04
ContinuousLinearMap.addCommMonoid	Continuous Linear Maps R04
ContinuousLinearMap.apply	Continuous Linear Maps -
ContinuousLinearMap.comp	Continuous Linear Maps R04, R07
ContinuousLinearMap.comp.congr_simp	Continuous Linear Maps R04
ContinuousLinearMap.comp_id	Continuous Linear Maps -
ContinuousLinearMap.comp_neg	Continuous Linear Maps -
ContinuousLinearMap.comp_zero	Continuous Linear Maps R04
ContinuousLinearMap.contDiff	Continuous Linear Maps -
ContinuousLinearMap.continuous	Continuous Linear Maps R02
ContinuousLinearMap.continuousConstSMul	Continuous Linear Maps -
ContinuousLinearMap.continuousSMul	Continuous Linear Maps -
ContinuousLinearMap.continuousSemilinearMapClass	Continuous Linear Maps R02, R07
ContinuousLinearMap.continuous_det	Continuous Linear Maps R04
ContinuousLinearMap.det	Continuous Linear Maps R04
ContinuousLinearMap.ext	Continuous Linear Maps -

Provider declaration	Role / routes
ContinuousLinearMap.flip	Continuous Linear Maps R04
ContinuousLinearMap.funLike	Continuous Linear Maps R02, R04, R07
ContinuousLinearMap.hasFDerivAt	Continuous Linear Maps -
ContinuousLinearMap.hasOpNorm	Continuous Linear Maps R03, R04, R07
ContinuousLinearMap.id	Continuous Linear Maps -
ContinuousLinearMap.instAddMonoid	Continuous Linear Maps R04
ContinuousLinearMap.instBorelSpace	Continuous Linear Maps -
ContinuousLinearMap.instCompleteSpace	Continuous Linear Maps -
ContinuousLinearMap.instContinuousEvalConst	Continuous Linear Maps R07
ContinuousLinearMap.instIsAddApply	Continuous Linear Maps R04
ContinuousLinearMap.instIsNegApply	Continuous Linear Maps -
ContinuousLinearMap.instIsSMulApply	Continuous Linear Maps R04, R07
ContinuousLinearMap.instIsZeroApply	Continuous Linear Maps R04
ContinuousLinearMap.instMeasurableSpace	Continuous Linear Maps -
ContinuousLinearMap.instModuleFinite	Continuous Linear Maps R07
ContinuousLinearMap.instSMul	Continuous Linear Maps R04, R07
ContinuousLinearMap.integral_apply	Continuous Linear Maps -
ContinuousLinearMap.integral_comp_comm	Continuous Linear Maps -
ContinuousLinearMap.le_opNorm	Continuous Linear Maps R07
ContinuousLinearMap.lipschitz	Continuous Linear Maps -
ContinuousLinearMap.lsmul	Continuous Linear Maps -
ContinuousLinearMap.map_sub	Continuous Linear Maps -
ContinuousLinearMap.module	Continuous Linear Maps R04
ContinuousLinearMap.neg	Continuous Linear Maps -
ContinuousLinearMap.opNorm_comp_le	Continuous Linear Maps -
ContinuousLinearMap.opNorm_le_bound	Continuous Linear Maps -
ContinuousLinearMap.pi	Continuous Linear Maps R04, R07
ContinuousLinearMap.postcomp	Continuous Linear Maps -
ContinuousLinearMap.precompL	Continuous Linear Maps -
ContinuousLinearMap.proj	Continuous Linear Maps R02, R07
ContinuousLinearMap.ring	Continuous Linear Maps R04
ContinuousLinearMap.smulCommClass	Continuous Linear Maps -
ContinuousLinearMap.smulRight	Continuous Linear Maps R04

Provider declaration	Role / routes
ContinuousLinearMap.smulRight.congr_simp	Continuous Linear Maps R04
ContinuousLinearMap.sub	Continuous Linear Maps R03, R04
ContinuousLinearMap.toLinearMap	Continuous Linear Maps R03, R04
ContinuousLinearMap.toNormedAddCommGroup	Continuous Linear Maps R04, R07
ContinuousLinearMap.toNormedSpace	Continuous Linear Maps R04, R07
ContinuousLinearMap.toNormedSpace._proof_1	Continuous Linear Maps R07
ContinuousLinearMap.toPseudoMetricSpace	Continuous Linear Maps R07
ContinuousLinearMap.toSeminormedAddCommGroup	Continuous Linear Maps R03, R04, R07
ContinuousLinearMap.topologicalAddGroup	Continuous Linear Maps -
ContinuousLinearMap.topologicalSpace	Continuous Linear Maps R04, R07
ContinuousLinearMap.zero	Continuous Linear Maps R04, R07
ContinuousLinearMap.zero_smulRight	Continuous Linear Maps R04
LinearEquiv.toContinuousLinearEquiv	Continuous Linear Maps R07
MeasureTheory.Measure.addHaar_image_continuousLinearMap	Continuous Linear Maps -
MeasureTheory.MemLp.continuousLinearMap_comp	Continuous Linear Maps -
Convex	Convex Geometry R02
Convex.isPreconnected	Convex Geometry -
Convex.neg	Convex Geometry -
Convex.set_average_mem	Convex Geometry -
convexHull	Convex Geometry R02
convexHull_eq	Convex Geometry R02
convexHull_min	Convex Geometry R02
convexHull_mono	Convex Geometry R02
convexHull_singleton	Convex Geometry R02
convex_ball	Convex Geometry -
convex_convexHull	Convex Geometry -
subset_convexHull	Convex Geometry R02
Continuous.matrix_det	Determinant Algebra R03, R07
LinearMap.det	Determinant Algebra R03, R04
LinearMap.det_eq_zero_iff_ker_ne_bot	Determinant Algebra -
LinearMap.det_toMatrix'	Determinant Algebra R04
Matrix.GeneralLinearGroup.mkOfDetNeZero	Determinant Algebra R03
Matrix.det	Determinant Algebra R03, R04, R07, R09

Provider declaration	Role / routes
Matrix.det.congr_simp	Determinant Algebra R03, R04, R07, R09
Matrix.detRowAlternating	Determinant Algebra R04
Matrix.det_apply	Determinant Algebra R04
Matrix.det_apply'	Determinant Algebra R04
Matrix.det_eq_zero_of_row_eq_zero	Determinant Algebra R04
Matrix.det_fin_zero	Determinant Algebra R09
Matrix.det_mul	Determinant Algebra R03, R09
Matrix.det_one	Determinant Algebra R07
Matrix.det_permute	Determinant Algebra R09
Matrix.det_smul_inv_vecMul_eq_cramer_transpose	Determinant Algebra R07, R09
Matrix.det_smul_of_tower	Determinant Algebra R03, R07
Matrix.det_updateRow_add	Determinant Algebra R04
Matrix.det_updateRow_smul	Determinant Algebra R04
Matrix.det_zero	Determinant Algebra R03, R04
Matrix.det_zero_of_row_eq	Determinant Algebra R09
Matrix.isUnit_iff_isUnit_det	Determinant Algebra R09
ContDiff.continuous_fderiv	Differential Calculus R04
ContDiff.fderiv_right	Differential Calculus R04
ContDiff.fderiv_succ	Differential Calculus R04
ContDiffAt.isSymmSndFDerivAt	Differential Calculus R04
Continuous.fderiv_one	Differential Calculus R04
Differentiable.fderiv_two	Differential Calculus R04
DifferentiableAt.hasFDerivAt	Differential Calculus R04
Filter.EventuallyEq.fderiv_eq	Differential Calculus -
HasCompactSupport.fderiv	Differential Calculus -
HasCompactSupport.hasFDerivAt_convolution_left	Differential Calculus -
HasDerivAt	Differential Calculus -
HasDerivAt.congr_simp	Differential Calculus -
HasDerivAt.const_add	Differential Calculus -
HasDerivAt.smul_const	Differential Calculus -
HasDerivAt.tendsto_slope_zero	Differential Calculus -
HasFDerivAt	Differential Calculus R04
HasFDerivAt.add	Differential Calculus R04

Provider declaration	Role / routes
HasFDerivAt.comp	Differential Calculus -
HasFDerivAt.comp_hasDerivAt_of_eq	Differential Calculus -
HasFDerivAt.const_smul	Differential Calculus R04
HasFDerivAt.const_sub	Differential Calculus -
HasFDerivAt.differentiableAt	Differential Calculus R04
HasFDerivAt.fderiv	Differential Calculus R04
HasFDerivAt.finsetProd	Differential Calculus R04
HasFDerivAt.hasFDerivWithinAt	Differential Calculus -
HasFDerivAt.smul_const	Differential Calculus R04
HasFDerivAt.sub_const	Differential Calculus -
HasFDerivAt.sum	Differential Calculus R04
HasFDerivWithinAt	Differential Calculus -
IsOpen.exists_is_const_of_fderiv_eq_zero	Differential Calculus -
IsSymmSndFDerivAt	Differential Calculus R04
Mathlib.Tactic.CancelDenoms.derive_trans	Differential Calculus -
fderiv	Differential Calculus R04
fderiv_clm_apply	Differential Calculus R04
fderiv_fun_const	Differential Calculus R04
fderiv_fun_smul	Differential Calculus R04
fderiv_of_notMem_tsupport	Differential Calculus R04
fderiv_pi	Differential Calculus R04
hasDerivAt_const_add_iff_simp_1	Differential Calculus -
hasDerivAt_id	Differential Calculus -
hasFDerivAt_id	Differential Calculus -
measurable_fderiv	Differential Calculus -
ExistsContDiffBumpBase.instHasContDiffBumpOffFiniteDimensionalReal	Finite-dimensional Linear Algebra -
FiniteDimensional	Finite-dimensional Linear Algebra R01, R02, R05, R07
FiniteDimensional.finiteDimensional_pi'	Finite-dimensional Linear Algebra R02
FiniteDimensional.finiteDimensional_self	Finite-dimensional Linear Algebra -
FiniteDimensional.of_locallyCompactSpace	Finite-dimensional Linear Algebra R01
FiniteDimensional.proper	Finite-dimensional Linear Algebra R07
FiniteDimensional.proper_real	Finite-dimensional Linear Algebra R01, R05
FiniteDimensional.rlike_to_real	Finite-dimensional Linear Algebra R02, R04

Provider declaration	Role / routes
instSecondCountableTopologyContinuousLinearMapIdOfFiniteDimensional	Finite-dimensional Linear Algebra -
hasFDerivAt_integral_of_dominated_loc_of_lip'	Integration -
Isometry	Isometry And Metric Geometry -
IsometryEquiv	Isometry And Metric Geometry R01
IsometryEquiv.instEquivLike	Isometry And Metric Geometry R01
IsometryEquiv.mk	Isometry And Metric Geometry -
IsometryEquiv.symm	Isometry And Metric Geometry R01
IsometryEquiv.symm_apply_apply	Isometry And Metric Geometry R01
IsometryEquiv.toEquiv	Isometry And Metric Geometry -
LinearIsometryEquiv	Isometry And Metric Geometry -
LinearIsometryEquiv.instEquivLike	Isometry And Metric Geometry -
LinearIsometryEquiv.mk	Isometry And Metric Geometry -
LinearIsometryEquiv.symm	Isometry And Metric Geometry -
LipschitzWith	Lipschitz Analysis R01
LipschitzWith.add	Lipschitz Analysis -
LipschitzWith.ae_differentiableAt	Lipschitz Analysis -
LipschitzWith.comp	Lipschitz Analysis -
LipschitzWith.continuous	Lipschitz Analysis -
LipschitzWith.dist_le_mul	Lipschitz Analysis -
LipschitzWith.hausdorffMeasure_image_le	Lipschitz Analysis -
LipschitzWith.of_dist_le_mul	Lipschitz Analysis R01
norm_fderiv_le_of_lipschitz	Lipschitz Analysis -
LinearMap.toMatrix	Matrix Linear Algebra -
LinearMap.toMatrix'	Matrix Linear Algebra R04
LinearMap.toMatrix'_comp	Matrix Linear Algebra -
LinearMap.trace_eq_matrix_trace	Matrix Linear Algebra -
Matrix	Matrix Linear Algebra R03, R04, R07, R09
Matrix.GeneralLinearGroup	Matrix Linear Algebra R03
Matrix.GeneralLinearGroup.toLin	Matrix Linear Algebra R03
Matrix.addCommMonoid	Matrix Linear Algebra R04
Matrix.cramer	Matrix Linear Algebra R07, R09
Matrix.cramer_transpose_apply	Matrix Linear Algebra R07, R09
Matrix.diag	Matrix Linear Algebra -

Provider declaration	Role / routes
Matrix.ext	Matrix Linear Algebra R03, R04, R07, R09
Matrix.instHMulOfFintypeOfMulOfAddCommMonoid	Matrix Linear Algebra R03, R07, R09
Matrix.instMulOfFintypeOfAddCommMonoid	Matrix Linear Algebra R09
Matrix.inv	Matrix Linear Algebra R07, R09
Matrix.module	Matrix Linear Algebra R04
Matrix.mulVec	Matrix Linear Algebra R03, R07
Matrix.mulVec_mulVec	Matrix Linear Algebra R07
Matrix.mulVec_sub	Matrix Linear Algebra -
Matrix.mul_assoc	Matrix Linear Algebra R09
Matrix.mul_nonsing_inv	Matrix Linear Algebra R09
Matrix.nonsing_inv_mul	Matrix Linear Algebra R07, R09
Matrix.one	Matrix Linear Algebra R07, R09
Matrix.one_apply_eq	Matrix Linear Algebra R07
Matrix.one_apply_ne	Matrix Linear Algebra R07
Matrix.one_mul	Matrix Linear Algebra R09
Matrix.one_mulVec	Matrix Linear Algebra R07
Matrix.semiring	Matrix Linear Algebra R03, R09
Matrix.smul	Matrix Linear Algebra R03, R07
Matrix.submatrix	Matrix Linear Algebra R03, R09
Matrix.submatrix_empty	Matrix Linear Algebra R09
Matrix.submatrix_id_id	Matrix Linear Algebra R09
Matrix.submatrix_mul	Matrix Linear Algebra R09
Matrix.trace	Matrix Linear Algebra -
Matrix.transpose	Matrix Linear Algebra R07, R09
Matrix.updateRow	Matrix Linear Algebra R04, R07, R09
Matrix.updateRow.congr_simp	Matrix Linear Algebra R04
Matrix.updateRow_apply	Matrix Linear Algebra R04
Matrix.updateRow_eq_self	Matrix Linear Algebra R04
Matrix.updateRow_ne	Matrix Linear Algebra R04, R07, R09
Matrix.updateRow_self	Matrix Linear Algebra R04, R07, R09
Matrix.vecEmpty	Matrix Linear Algebra R09
Matrix.vecMul	Matrix Linear Algebra R07, R09
Matrix.vecMul_one	Matrix Linear Algebra R09

Provider declaration	Role / routes
Matrix.vecMul_vecMul	Matrix Linear Algebra R09
Matrix.zero	Matrix Linear Algebra R03, R04
continuous_matrix	Matrix Linear Algebra R03, R07
instTopologicalSpaceMatrix	Matrix Linear Algebra R03
IsCompact.measure_lt_top	Measure Theory -
IsCompact.measure_ne_top	Measure Theory R08
IsOpen.measure_pos	Measure Theory R05
MeasureTheory.AEStronglyMeasurable	Measure Theory R04
MeasureTheory.AEStronglyMeasurable.norm	Measure Theory -
MeasureTheory.AEStronglyMeasurable.pow	Measure Theory R04
MeasureTheory.AEStronglyMeasurable.smul	Measure Theory -
MeasureTheory.AEStronglyMeasurable.sub	Measure Theory R04
MeasureTheory.ConvolutionExists	Measure Theory -
MeasureTheory.ConvolutionExistsAt	Measure Theory -
MeasureTheory.ConvolutionExistsAt.integrable	Measure Theory -
MeasureTheory.Integrable	Measure Theory R04
MeasureTheory.Integrable._auto_1	Measure Theory R04
MeasureTheory.Integrable.add	Measure Theory R04
MeasureTheory.Integrable.aestronglyMeasurable	Measure Theory -
MeasureTheory.Integrable.const_mul	Measure Theory R04
MeasureTheory.Integrable.eval	Measure Theory -
MeasureTheory.Integrable.integrableOn	Measure Theory -
MeasureTheory.Integrable.locallyIntegrable	Measure Theory -
MeasureTheory.Integrable.mono'	Measure Theory R04
MeasureTheory.Integrable.mul_const	Measure Theory -
MeasureTheory.Integrable.norm	Measure Theory -
MeasureTheory.IntegrableOn	Measure Theory -
MeasureTheory.IntegrableOn.mono_set	Measure Theory -
MeasureTheory.IntegrableOn.of_bound	Measure Theory -
MeasureTheory.IsFiniteMeasure.mk	Measure Theory -
MeasureTheory.LocallyIntegrable	Measure Theory -
MeasureTheory.LocallyIntegrableOn	Measure Theory R05
MeasureTheory.LocallyIntegrableOn.integrableOn_compact_subset	Measure Theory -

Provider declaration	Role / routes
MeasureTheory.LocallyIntegrableOn.mono	Measure Theory -
MeasureTheory.Measure	Measure Theory R04, R05, R08
MeasureTheory.Measure.IsAddHaarMeasure	Measure Theory R05, R08
MeasureTheory.Measure.IsAddHaarMeasure.isNegInvariant_of_innerRegular	Measure Theory -
MeasureTheory.Measure.IsAddHaarMeasure.sigmaFinite	Measure Theory R04
MeasureTheory.Measure.IsAddHaarMeasure.tolsAddLeftInvariant	Measure Theory -
MeasureTheory.Measure.IsAddHaarMeasure.tolsFiniteMeasureOnCompacts	Measure Theory R04, R08
MeasureTheory.Measure.IsAddHaarMeasure.tolsOpenPosMeasure	Measure Theory R05, R08
MeasureTheory.Measure.IsOpenPosMeasure	Measure Theory R05
MeasureTheory.Measure.QuasiMeasurePreserving.ae	Measure Theory -
MeasureTheory.Measure.eqOn_open_of_ae_eq	Measure Theory R05
MeasureTheory.Measure.exists_mem_of_measure_ne_zero_of_ae	Measure Theory R05
MeasureTheory.Measure.hausdorffMeasure	Measure Theory -
MeasureTheory.Measure.hausdorffMeasure.congr_simp	Measure Theory -
MeasureTheory.Measure.instFunLike	Measure Theory R04, R05, R08
MeasureTheory.Measure.instInnerRegularOfPseudoMetrizableSpaceOfSigmaCompactSpaceOfBorelSpaceOfSigmaFinite	Measure Theory -
MeasureTheory.Measure.instIsAddHaarMeasureForallVolumeOfMeasurableAddOfSigmaFinite	Measure Theory -
MeasureTheory.Measure.instIsFiniteMeasureOnCompactsForallVolumeOfSigmaFinite	Measure Theory R04
MeasureTheory.Measure.instIsLocallyFiniteMeasureForallVolumeOfSigmaFinite	Measure Theory -
MeasureTheory.Measure.instIsOpenPosMeasureForallVolumeOfSigmaFinite	Measure Theory -
MeasureTheory.Measure.instOuterMeasureClass	Measure Theory R04, R05
MeasureTheory.Measure.instPartialOrder	Measure Theory R05
MeasureTheory.Measure.instZero	Measure Theory R05
MeasureTheory.Measure.measurePreserving_sub_left	Measure Theory -
MeasureTheory.Measure.measure_pos_of_nonempty_interior	Measure Theory R08
MeasureTheory.Measure.real	Measure Theory -
MeasureTheory.Measure.restrict	Measure Theory R04, R05
MeasureTheory.Measure.restrict_apply	Measure Theory -
MeasureTheory.Measure.restrict_empty	Measure Theory R05
MeasureTheory.Measure.restrict_iUnion_le	Measure Theory R05
MeasureTheory.Measure.restrict_mono	Measure Theory R05
MeasureTheory.Measure.sum	Measure Theory R05
MeasureTheory.Measure.sum_apply_of_countable	Measure Theory R05

Provider declaration	Role / routes
MeasureTheory.MeasurePreserving.integral_comp	Measure Theory -
MeasureTheory.MeasurePreserving.quasiMeasurePreserving	Measure Theory -
MeasureTheory.MeasureSpace.pi	Measure Theory R04
MeasureTheory.MeasureSpace.toMeasurableSpace	Measure Theory R04
MeasureTheory.MeasureSpace.volume	Measure Theory R04
MeasureTheory.MemLp	Measure Theory R04
MeasureTheory.MemLp._auto_1	Measure Theory R04
MeasureTheory.MemLp.add	Measure Theory R04
MeasureTheory.MemLp.eLpNorm_eq_integral_rpow_norm	Measure Theory R04
MeasureTheory.MemLp.eLpNorm_lt_top	Measure Theory -
MeasureTheory.MemLp.eLpNorm_ne_top	Measure Theory R04
MeasureTheory.MemLp.integrable_norm_pow	Measure Theory R04
MeasureTheory.MemLp.locallyIntegrable	Measure Theory -
MeasureTheory.MemLp.norm	Measure Theory R04
MeasureTheory.MemLp.of_bound	Measure Theory -
MeasureTheory.MemLp.sub	Measure Theory R04
MeasureTheory.Pi.isAddLeftInvariant_volume	Measure Theory -
MeasureTheory.Pi.isNegInvariant_volume	Measure Theory -
MeasureTheory.StronglyMeasurable	Measure Theory -
MeasureTheory.StronglyMeasurable.aestronglyMeasurable	Measure Theory -
MeasureTheory.StronglyMeasurable.indicator	Measure Theory -
MeasureTheory.StronglyMeasurable.measurable	Measure Theory -
MeasureTheory.ae	Measure Theory R04, R05
MeasureTheory.ae.congr_simp	Measure Theory R05
MeasureTheory.ae_iff	Measure Theory R05
MeasureTheory.ae_of_all	Measure Theory R04
MeasureTheory.ae_restrict_mem	Measure Theory -
MeasureTheory.ae_restrict_neBot	Measure Theory -
MeasureTheory.ae_restrict_of_ae	Measure Theory -
MeasureTheory.ae_restrict_of_ae_restrict_of_subset	Measure Theory R05
MeasureTheory.ae_zero	Measure Theory R05
MeasureTheory.average	Measure Theory -
MeasureTheory.convolution	Measure Theory -

Provider declaration	Role / routes
MeasureTheory.convolution_def	Measure Theory -
MeasureTheory.eLpNorm	Measure Theory R04
MeasureTheory.eLpNorm._auto_1	Measure Theory R04
MeasureTheory.eLpNorm_add_le	Measure Theory R04
MeasureTheory.eLpNorm_congr_ae	Measure Theory -
MeasureTheory.eLpNorm_indicator_eq_eLpNorm_restrict	Measure Theory -
MeasureTheory.eLpNorm_le_eLpNorm_mul_eLpNorm'_of_norm	Measure Theory R04
MeasureTheory.eLpNorm_mono	Measure Theory R04
MeasureTheory.eLpNorm_mono_real	Measure Theory -
MeasureTheory.eLpNorm_norm	Measure Theory R04
MeasureTheory.eLpNorm_norm_rpow	Measure Theory R04
MeasureTheory.eLpNorm_nsmul	Measure Theory R04
MeasureTheory.eLpNorm_restrict_le	Measure Theory -
MeasureTheory.eLpNorm_sum_le	Measure Theory -
MeasureTheory.eval_integral	Measure Theory -
MeasureTheory.hausdorffMeasure_pi_real	Measure Theory -
MeasureTheory.instSFiniteOfSigmaFinite	Measure Theory -
MeasureTheory.integrableOn_const	Measure Theory -
MeasureTheory.integrableOn_const_iff_simp_1	Measure Theory -
MeasureTheory.integrable_fun_zero_simp_1	Measure Theory R04
MeasureTheory.integrable_indicator_iff	Measure Theory -
MeasureTheory.integral	Measure Theory R04
MeasureTheory.integral_add	Measure Theory R04
MeasureTheory.integral_congr_ae	Measure Theory -
MeasureTheory.integral_const_mul	Measure Theory -
MeasureTheory.integral_divergence_of_hasFDerivAt_off_countable	Measure Theory R04
MeasureTheory.integral_finsetSum	Measure Theory -
MeasureTheory.integral_image_eq_integral_abs_det_fderiv_smul	Measure Theory -
MeasureTheory.integral_indicator	Measure Theory -
MeasureTheory.integral_neg	Measure Theory -
MeasureTheory.integral_nonneg_of_ae	Measure Theory R04
MeasureTheory.integral_sub	Measure Theory R04
MeasureTheory.integral_zero	Measure Theory R04

Provider declaration	Role / routes
MeasureTheory.isLocallyFiniteMeasure_of_isFiniteMeasureOnCompacts	Measure Theory -
MeasureTheory.lintegral	Measure Theory -
MeasureTheory.locallyIntegrableOn_const	Measure Theory -
MeasureTheory.measure_mono	Measure Theory -
MeasureTheory.measure_union	Measure Theory R08
MeasureTheory.memLp_indicator_iff_restrict	Measure Theory -
MeasureTheory.memLp_one_iff_integrable	Measure Theory R04
MeasureTheory.norm_integral_le_integral_norm	Measure Theory R04
MeasureTheory.ofReal_integral_eq_lintegral_ofReal	Measure Theory -
MeasureTheory.setAverage_eq	Measure Theory -
MeasureTheory.setIntegral_congr_set	Measure Theory -
MeasureTheory.setIntegral_const	Measure Theory -
MeasureTheory.setIntegral_eq_integral_of_ae_compl_eq_zero	Measure Theory R04
MeasureTheory.setIntegral_eq_integral_of_forall_compl_eq_zero	Measure Theory -
MeasureTheory.support_convolution_subset	Measure Theory -
MeasureTheory.tendsto_integral_filter_of_dominated_convergence	Measure Theory -
Real.measureSpace	Measure Theory R04
instIsAddHaarMeasureVolume	Measure Theory R04
ContDiffBump.contDiff_normed	Normed Space Geometry -
ContDiffBump.dist_normed_convolution_le	Normed Space Geometry -
ContDiffBump.hasCompactSupport_normed	Normed Space Geometry -
ContDiffBump.integrable_normed	Normed Space Geometry -
ContDiffBump.normed	Normed Space Geometry -
ContDiffBump.support_normed_eq	Normed Space Geometry -
Continuous.norm	Normed Space Geometry -
ContinuousENorm.toENorm	Normed Space Geometry R04
DenselyNormedField.toNontriviallyNormedField	Normed Space Geometry R01, R03, R04, R07
DenselyNormedField.toNormedField	Normed Space Geometry -
ENorm	Normed Space Geometry -
ENorm.enorm	Normed Space Geometry -
Filter.Tendsto.norm	Normed Space Geometry -
HasSolidNorm.orderClosedTopology	Normed Space Geometry R02, R04, R07, R08
InnerProductSpace.toNormedSpace	Normed Space Geometry R02, R03, R04, R07

Provider declaration	Role / routes
Lean.Data.AC.Context.eq_of_norm	Normed Space Geometry R09
Mathlib.Meta.NormNum.IsInt.of_raw	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.IsInt.to_isNat	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.IsInt.to_raw_eq	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.IsNNRat.to_eq	Normed Space Geometry -
Mathlib.Meta.NormNum.IsNNRat.to_isNat	Normed Space Geometry R01
Mathlib.Meta.NormNum.IsNat.of_raw	Normed Space Geometry R01, R04, R07, R08, R09
Mathlib.Meta.NormNum.IsNat.to_eq	Normed Space Geometry -
Mathlib.Meta.NormNum.IsNat.to_isInt	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.IsNat.to_isNNRat	Normed Space Geometry R01
Mathlib.Meta.NormNum.IsNat.to_raw_eq	Normed Space Geometry R01, R04, R07, R08, R09
Mathlib.Meta.NormNum.instAddMonoidWithOne	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.instAddMonoidWithOne'	Normed Space Geometry R01
Mathlib.Meta.NormNum.instAtLeastTwo	Normed Space Geometry R01, R04
Mathlib.Meta.NormNum.isInt_add	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.isInt_mul	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.isInt_neg	Normed Space Geometry R01, R04, R07
Mathlib.Meta.NormNum.isNNRat_div	Normed Space Geometry -
Mathlib.Meta.NormNum.isNNRat_inv_pos	Normed Space Geometry R01
Mathlib.Meta.NormNum.isNNRat_lt_true	Normed Space Geometry -
Mathlib.Meta.NormNum.isNNRat_mul	Normed Space Geometry -
Mathlib.Meta.NormNum.isNat_abs_neg	Normed Space Geometry -
Mathlib.Meta.NormNum.isNat_abs_nonneg	Normed Space Geometry -
Mathlib.Meta.NormNum.isNat_add	Normed Space Geometry R01, R04
Mathlib.Meta.NormNum.isNat_eq_false	Normed Space Geometry R04
Mathlib.Meta.NormNum.isNat_eq_true	Normed Space Geometry -
Mathlib.Meta.NormNum.isNat_le_true	Normed Space Geometry R04
Mathlib.Meta.NormNum.isNat_lt_true	Normed Space Geometry R04
Mathlib.Meta.NormNum.isNat_mul	Normed Space Geometry R01, R04, R07, R08, R09
Mathlib.Meta.NormNum.isNat_natCast	Normed Space Geometry -
Mathlib.Meta.NormNum.isNat_ofNat	Normed Space Geometry R01, R04, R07, R08
Measurable.norm	Normed Space Geometry -
NNNorm.nnnorm	Normed Space Geometry -

Provider declaration	Role / routes
NonUnitalNormedCommRing.toNonUnitalCommRing	Normed Space Geometry R02, R04, R07
NonUnitalNormedCommRing.toNonUnitalNormedRing	Normed Space Geometry R04
NonUnitalNormedRing.toNormedAddCommGroup	Normed Space Geometry R04
NontriviallyNormedField.toNormedField	Normed Space Geometry R01, R03, R04, R07
Norm.norm	Normed Space Geometry R01, R03, R04, R07, R08
NormMulClass.toNoZeroDivisors	Normed Space Geometry R02
NormOneClass.norm_one	Normed Space Geometry -
NormedAddCommGroup	Normed Space Geometry R01, R02, R05, R07, R08
NormedAddCommGroup.toAddCommGroup	Normed Space Geometry R01, R02, R04, R05, R07, R08
NormedAddCommGroup.toENormedAddCommMonoid	Normed Space Geometry R04
NormedAddCommGroup.toMetricSpace	Normed Space Geometry R01, R08
NormedAddCommGroup.toNorm	Normed Space Geometry R01, R04, R07, R08
NormedAddCommGroup.toNormedAddGroup	Normed Space Geometry R01, R08
NormedAddGroup.toAddGroup	Normed Space Geometry R01, R08
NormedAddGroup.toNorm	Normed Space Geometry R01, R08
NormedAlgebra.toAlgebra	Normed Space Geometry R04
NormedAlgebra.toNormedSpace	Normed Space Geometry R04
NormedCommRing.toNonUnitalNormedCommRing	Normed Space Geometry R02, R04, R07
NormedCommRing.toNormedRing	Normed Space Geometry R02, R04, R07
NormedDivisionRing.toDivisionRing	Normed Space Geometry R08
NormedDivisionRing.toNorm	Normed Space Geometry R08
NormedDivisionRing.toNormMulClass	Normed Space Geometry R02, R04
NormedDivisionRing.to_normOneClass	Normed Space Geometry -
NormedField.toField	Normed Space Geometry R01, R02, R04, R07, R08
NormedField.toNormedCommRing	Normed Space Geometry R04, R08
NormedField.toNormedDivisionRing	Normed Space Geometry R02, R04, R08
NormedField.toNormedSpace	Normed Space Geometry R04, R07
NormedRing.toNonUnitalNormedRing	Normed Space Geometry R04
NormedRing.toNorm	Normed Space Geometry R04, R07
NormedRing.toRing	Normed Space Geometry R04
NormedSpace	Normed Space Geometry R01, R02, R05, R07, R08
NormedSpace.norm_smul_normalize	Normed Space Geometry R01
NormedSpace.normalize	Normed Space Geometry R01

Provider declaration	Role / routes
NormedSpace.normalize_eq_self_of_norm_eq_one	Normed Space Geometry R01
NormedSpace.normalize_smul_of_pos	Normed Space Geometry R01
NormedSpace.tolsBoundedSMul	Normed Space Geometry R01, R04, R07
NormedSpace.toModule	Normed Space Geometry R01, R02, R04, R05, R07, R08
NormedSpace.toNormSMulClass	Normed Space Geometry R01, R07
Pi.instNormSMulClass	Normed Space Geometry -
Pi.norm_def	Normed Space Geometry -
Pi.normedAddCommGroup	Normed Space Geometry R02, R04
Pi.normedAddGroup	Normed Space Geometry -
Pi.normedRing	Normed Space Geometry R04, R07
Pi.normedSpace	Normed Space Geometry R02, R03, R04, R07
Prod.normedAddCommGroup	Normed Space Geometry R04
Prod.normedSpace	Normed Space Geometry R04
RCLike.toDenselyNormedField	Normed Space Geometry -
RCLike.toNormedAlgebra	Normed Space Geometry R04
Real.denselyNormedField	Normed Space Geometry R01, R03, R04, R07
Real.norm	Normed Space Geometry R01, R03, R04, R07, R08
Real.norm_eq_abs	Normed Space Geometry R01, R07, R08
Real.norm_of_nonneg	Normed Space Geometry R04
Real.normedAddCommGroup	Normed Space Geometry R02, R04, R07, R08
Real.normedCommRing	Normed Space Geometry R02, R03, R04, R05, R07, R08
Real.normedField	Normed Space Geometry R01, R02, R04, R05, R07, R08
continuous_norm	Normed Space Geometry R08
dist_eq_norm	Normed Space Geometry R01, R04, R07
enorm_ne_top	Normed Space Geometry -
enorm_one	Normed Space Geometry -
instHasSolidNormReal	Normed Space Geometry R02, R04, R07, R08
instIsRCLikeNormedField	Normed Space Geometry R04
mem_sphere_zero_iff_norm	Normed Space Geometry -
minSmoothness_of_isRCLikeNormedField	Normed Space Geometry R04
norm_add_le	Normed Space Geometry R01, R04
norm_eq_of_mem_sphere	Normed Space Geometry R01
norm_eq_zero	Normed Space Geometry R01, R08

Provider declaration	Role / routes
norm_eq_zero_simp_1	Normed Space Geometry R01, R08
norm_inv	Normed Space Geometry R08
norm_le_pi_norm	Normed Space Geometry R04, R07
norm_mul	Normed Space Geometry R04
norm_ne_zero_iff	Normed Space Geometry R01
norm_nonneg	Normed Space Geometry R01, R03, R04, R07
norm_norm	Normed Space Geometry R01
norm_pos_iff	Normed Space Geometry R01
norm_pow	Normed Space Geometry -
norm_smul	Normed Space Geometry R01, R07
norm_sub_le	Normed Space Geometry -
norm_sum_le	Normed Space Geometry -
norm_zero	Normed Space Geometry R01, R04, R07
pi_norm_le_iff_of_nonneg	Normed Space Geometry R07
squeeze_zero_norm'	Normed Space Geometry R04
AddGroupSeminormClass.toNonnegHomClass	Seminormed Geometry R08
AddGroupSeminormClass.toZeroHomClass	Seminormed Geometry R08
ENormedAddCommMonoid.toESeminormedAddCommMonoid	Seminormed Geometry R04
ESeminormedAddCommMonoid.toESeminormedAddMonoid	Seminormed Geometry R04
ESeminormedAddMonoid.toAddMonoid	Seminormed Geometry R04
ESeminormedAddMonoid.toContinuousENorm	Seminormed Geometry R04
NonUnitalNormedRing.toNonUnitalSeminormedRing	Seminormed Geometry R04
NonUnitalSeminormedCommRing.toNonUnitalSeminormedRing	Seminormed Geometry R02, R03, R04, R05, R07
NonUnitalSeminormedRing.toSeminormedAddCommGroup	Seminormed Geometry R02, R03, R04, R05, R07
NormedAddCommGroup.toSeminormedAddCommGroup	Seminormed Geometry R01, R02, R04, R05, R07, R08
NormedAddGroup.toSeminormedAddGroup	Seminormed Geometry -
NormedCommRing.toSeminormedCommRing	Seminormed Geometry R02, R03, R04, R05, R07, R08
NormedRing.toSeminormedRing	Seminormed Geometry R04, R07
Pi.seminormedAddCommGroup	Seminormed Geometry R03, R04, R07
Pi.seminormedAddGroup	Seminormed Geometry R07
Seminorm	Seminormed Geometry R08
Seminorm.ball	Seminormed Geometry -
Seminorm.ball_zero_eq	Seminormed Geometry -

Provider declaration	Role / routes
Seminorm.closedBall	Seminormed Geometry R08
Seminorm.comp	Seminormed Geometry -
Seminorm.instFunLike	Seminormed Geometry R08
Seminorm.instSeminormClass	Seminormed Geometry R08
Seminorm.mem_ball._simp_1	Seminormed Geometry -
Seminorm.mem_closedBall._simp_1	Seminormed Geometry R08
Seminorm.mem_closedBall_zero	Seminormed Geometry R08
SeminormClass.map_smul_eq_mul	Seminormed Geometry R08
SeminormClass.toAddGroupSeminormClass	Seminormed Geometry R08
SeminormedAddCommGroup.toAddCommGroup	Seminormed Geometry R01, R04, R07, R08
SeminormedAddCommGroup.toIsTopologicalAddGroup	Seminormed Geometry R01, R04
SeminormedAddCommGroup.toNorm	Seminormed Geometry R01, R04, R07
SeminormedAddCommGroup.toPseudoMetricSpace	Seminormed Geometry R01, R02, R04, R05, R07, R08
SeminormedAddCommGroup.toSeminormedAddGroup	Seminormed Geometry R01, R03, R04, R05, R07, R08
SeminormedAddCommGroup.to_isUniformAddGroup	Seminormed Geometry -
SeminormedAddGroup.toAddGroup	Seminormed Geometry R01, R04
SeminormedAddGroup.toContinuousENorm	Seminormed Geometry R04, R05
SeminormedAddGroup.toNNNorm	Seminormed Geometry -
SeminormedAddGroup.toNorm	Seminormed Geometry R01, R04, R07
SeminormedAddGroup.toPseudoMetricSpace	Seminormed Geometry R01, R04
SeminormedCommRing.toNonUnitalSeminormedCommRing	Seminormed Geometry R02, R03, R04, R05, R07
SeminormedCommRing.toSeminormedRing	Seminormed Geometry R03, R04, R07, R08
SeminormedRing.toNonUnitalSeminormedRing	Seminormed Geometry R07
SeminormedRing.toNorm	Seminormed Geometry R08
SeminormedRing.toPseudoMetricSpace	Seminormed Geometry R04
SeminormedRing.toRing	Seminormed Geometry R04
closedBall_normSeminorm	Seminormed Geometry R08
normSeminorm	Seminormed Geometry R08
Metric.sphere	Sphere Geometry R01
ne_zero_of_mem_unit_sphere	Sphere Geometry R01
Homeomorph	Topological Equivalence R01
Homeomorph.mk	Topological Equivalence R01
Real.locallyFinite_volume	Volume And Measure -