Calculus on Manifolds: Exercises

These notes reflect material from our text, *Analysis on Manifolds*, by James R. Munkres, published in the Advanced Books Classics collection by Westview Press, Perseus Book Group, 1991.

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§*2. Matrix Inversion and Determinants*: 1, 2, 3, 4, 5

§*3. Review of Topology in* $\mathbb{R}^n$: 1, 2, 3, 5, 7, 8, 9

§*4. Compact Subspaces and Connected Subspaces of* $\mathbb{R}^n$: 1, 2, 3, 4

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§*6. Continuously Differentiable Functions*: 1, 2, 5, 6, 7, 10

§*7. The Chain Rule*: 1, 2, 3

§*8. The Inverse Function Theorem*: 1, 2, 3, 4, 5

§*9. The Implicit Function Theorem*: 1, 2, 5

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§*11. Existence of the Integral*: 1, 2, 3, 6, 8

§*12. Evaluation of the Integral*: 1, 4

§*13. The Integral over a Bounded Set*: 1, 4

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§*15. Improper Integrals*: 1, 2, 4, 5

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§*16. Partitions of Unity*: 1, 2, 3

§*17. The Change of Variables Theorem*: 1, 2, 3, 4, 5, 6, 7

§*18. Diffeomorphisms in* $\mathbb{R}^n$: 1, 3, 4

§*19. Proof of the Change of Variables Theorem*: 1, 2, 3, 4, 5

§*20. Applications of Change of Variables*: 1, 2, 3, 4, 5

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§*22. The Volume of a Parametrized Manifold*: 1, 2, 3

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§*24. The Boundary of a Manifold*: 1, 2, 3, 4, 5, 6

§*25. Integrating a Scalar Function over a Manifold*: 1, 2, 3, 4, 5, 8

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§*27. Alternating Tensors*: 4

§*28. The Wedge Product*: 1 (part a and c), 5, 6

§*29. Tangent Vectors and Differential Forms*: 1, 2

§*30. The Differential Operator*: 1, 2, 3, 4, 5

§*31. Application to Vector and Scalar Fields*: 3

§*32. The Action of a Differentiable Map*: 1, 2, 3, 4

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§*33. Integrating Forms over Parametrized-Manifolds*: 1, 2, 3

§*34. Orientable Manifolds*: 4, 5, 6, 7, 8

§*35. Integrating Forms over Oriented Manifolds*: 3

§*36. A Geometric Interpretation of Forms and Integrals*: 1

§*37. The Generalized Stokes' Theorem*: 2, 4, 5

§*38. Applications to Vector Analysis*: 1, 2, 3, 4, 5