

Math 104: Calculus, Part I. (4h. 1 c.u.)

Gen Req IV: May be counted towards the General Requirement in Formal Reasoning & Analysis.

Brief review of High School Calculus, applications of integrals, transcendental functions, methods and applications of integration, infinite series, Taylor's theorem, parametric curves and polar coordinates. Use of symbolic manipulation and graphics software in Calculus. Note: This course uses Maple ®

Texts: Stewart, *Calculus, 5th Edition*

Maple/Calculus Lab Manual for Math 103/104/114

6 Applications of Integration

6.1	Areas between Curves	375	2, 3, 7, 11, 34, 40, 41
6.2	Volumes	382	20, 21, 22, 31, 32, 69
6.3	Volumes by Cylindrical Shells	393	1, 2, 16, 17, 28, 46
6.4	Work	398	5, 6, 7, 14, 27, 30
6.5	Average Value of a Function	402	2, 5, 7

7 Inverse Functions: Exponential, Logarithmic, and Inverse Trigonometric Functions

7.1	Inverse Functions	413	3, 9, 19, 22, 26, 36, 43
7.2	Exponential Functions and Their Derivatives	421	1, 11, 13, 16, 20, 30, 38, 44, 55, 72, 82
7.3	Logarithmic Functions	434	1, 2, 12, 18, 24, 39, 56, 60, 66
7.4	Derivatives of Logarithmic Functions	441	3, 6, 10, 28, 32, 37
7.5	Inverse Trigonometric Functions	477	3, 23, 31, 46, 50, 61, 67
7.6	Hyperbolic Functions	486	4, 6, 9, 34, 35, 48
7.7	Indeterminate Forms and L'Hospital's Rule	493	1, 2, 3, 4, 9, 15, 29

8 Techniques of Integration

8.1	Integration by Parts	511	3, 10, 12, 34, 52, 60
8.2	Trigonometric Integrals	518	1, 2, 10, 14, 15
8.3	Trigonometric Substitution	525	4, 5, 9
8.4	Integration of Rational Functions by Partial Fractions	532	1, 4, 7, 10, 12
8.5	Strategy for Integration	541	5, 12, 27, 31, 37, 51, 60, 74, 76, 81
8.6	Integration Using Tables and Computer Algebra Systems	547	6, 7, 20
8.7	Approximate Integration	554	3, 11, 21, 30
8.8	Improper Integrals	566	2, 5, 6, 10, 14, 17, 29, 49

9 Further Applications of Integration

9.1	Arc Length	583	2, 7, 24, 29
9.2	Area of a Surface of Revolution	590	2, 5, 20, 25
9.3	Applications to Physics and Engineering	597	3, 13, 20, 25, 32, 38
9.4	Applications to Economics and Biology	607	1, 2, 6
9.5	Probability	611	1, 3, 5, 8, 9, 12

11 Parametric Equations and Polar Coordinates

11.1	Curves Defined by Parametric Equations	687	2, 3, 6, 11, 24, 26, 28, 44
11.2	Calculus with Parametric Curves	696	5, 8, 13, 36, 43
11.3	Polar Coordinates	705	9, 16, 22, 29, 40, 48, 54
11.4	Areas and Lengths in Polar Coordinates	715	3, 6, 35
11.5	Conic Sections	720	2, 4, 12, 14, 20, 22
11.6	Conic Sections in Polar Coordinates	728	1, 2, 3, 19

12 Infinite Sequences and Series

12.1	Sequences	737	2, 5, 7, 9, 17, 24, 50, 65
12.2	Series	749	1, 9, 41, 43, 51, 65
12.3	The Integral Test and Estimates of Sums	759	3, 5, 11, 28
12.4	The Comparison Tests	766	1, 2, 3, 6, 17, 37
12.5	Alternating Series	771	7, 8, 24, 35
12.6	Absolute Convergence and the Ratio and Root Tests	776	3, 4, 8, 2
12.7	Strategy for Testing Series	783	2, 3, 8, 37, 38
12.8	Power Series	785	2, 7, 12, 23, 30
12.9	Representations of Functions as Power Series	790	3, 4, 9, 13, 35
12.10	Taylor and Maclaurin Series	796	8, 9, 11, 21, 37, 43
12.11	The Binomial Series	808	2, 4, 12
12.12	Applications of Taylor Polynomials	812	2, 5, 23, 28

NOTES: All sections of Math 104 will have a common final examination. Common midterm examinations *may* be given outside regular class times at the professors' option.

Sample Final Exam Problems (which may be found at the end of this Lab Manual and on the Mathematics Department's web site) also form part of the core problem set.