Math 104 Calculus, Part I

Brief review of High School calculus, applications of integrals, transcendental functions, methods of integration, infinite series, Taylor's theorem, and first order ordinary differential equations. Use of symbolic manipulation and graphics software in calculus.

Text: *Thomas' Calculus Early Transcendentals Custom Edition for the University of Pennsylvania* Pearson 2014. Package ISBN : 978-1-269-95070-1

Section	Title	Core Problems
6.1	Volumes Using Cross Sections	1, 3, 11, 15, 22, 37, 42, 45, 51, 61, 63.
6.2	Volumes Using Cylindrical Shells	1, 7, 16, 25, 29, 35, 37, 40, 46.
6.3	Arc Length	4, 11, 23, 27, 36.
6.4	Areas of Surfaces of Revolution	5(a), 9, 14, 19, 21, 30, 32.
*6.5 Optional	Work and Fluid Forces	1, 6, 9, 23, 25.
6.6	Moments and Centers of Mass	1, 6, 10, 15, 23, 29, 34, 37.
8.1	Integration Using Basic Formulas	4, 11, 18, 29, 35, 43.
8.2	Integration by Parts	3, 6, 13, 21, 30, 35, 37, 45, 47, 55, 61, 71.
8.3	Trigonometric Integrals	3, 10, 14, 19, 33, 36, 44, 46, 53, 64, 69, 72.
8.4	Trigonometric Substitutions	3, 6, 8, 23, 29, 36, 49, 52, 53.
8.5	Integration by Partial Fractions	1, 13, 18, 21, 34, 39, 53, 56.
*8.6 Optional	Integral Tables and Computer Algebra Systems	3, 15, 27, 43, 52, 58, 64.
8.7	Numerical Integration	1, 13, 18, 25, 28, 31, 36.
8.8	Improper Integrals	5, 24, 29, 36, 43, 51, 55, 66, 67, 73, 77.
8.9	Probability	2, 8, 10, 16, 19, 23, 24, 27, 34, 36, 43, 51.
10.1	Sequences	1, 7, 15, 17, 27, 31, 32, 42, 57, 67, 79, 91, 99, 111, 121.
10.2	Infinite Series	1, 9, 17, 20, 32, 36, 41, 52, 68, 71, 79, 91, 94.
10.3	The Integral Test	5, 16, 20, 29, 35, 50, 55.
10.4	Comparison Tests	1, 9, 17, 25, 28, 59, 63.
10.5	The Ratio and Root Tests	3, 11, 20, 31, 36, 57, 65.
10.6	Alternating Series, Absolute and Conditional Convergence	3, 9, 11, 15, 37, 49, 59, 66.
10.7	Power Series	9, 14, 19, 37, 42, 49, 54.
10.8	Taylor and Maclaurin Series	3, 9, 15, 19, 26, 35, 41.
10.9	Convergence of Taylor Series	1, 9, 11, 25, 29, 36, 40, 47, 52.
10.10	The Binomial Series and Applications of Taylor Series	3, 12, 15, 23, 27, 33, 40, 41, 48, 55, 59, 67.

Section	Title	Core Problems
9.1	Solutions, Slope Fields, and Euler's Method	1-4, 7, 12, 29, 35, 39.
7.2	Exponential Change and Separable Differential Equations	3, 9, 17, 21, 23, 26, 29, 34, 37, 44, 46.
9.2	First Order Linear Equations	1, 8, 15, 18, 23, 26, 29.
9.3	Applications of First Order Ordinary Differential Equations	1, 7, 13, 16.

SAMPLE EXAM QUESTIONS (available from the Math Dept's Math 104 Web Page:

http://www.math.upenn.edu/ugrad/calc/m104/) also form a part of the core.

The core problems indicate the kind of basic problems you will need to be able to solve by hand. They also provide a guide to the basic level of difficulty to be expected on the final exam.

Note: All sections of Math 104 have a COMMON FINAL EXAM

Note for the Active Learning Sections:

The Active Learning sections have the same common final and the same textbook. They have the same syllabus subject to following amendments.

The optional sections 6.5 and 8.5 are not covered. The extra sections 7.3 and 7.4 are covered. The syllabus specifically includes all pre-requisite material. Instruction will be provided on this material and it will be included on examinations. In addition to the selected sections of the textbook, the syllabus includes these conceptual and cognitive skills:

Facility with functions and their graphs;
Mathematical modeling and word problems;
Exponential growth and decay;
Computation, numerical estimation and bounding;
Understanding of units;
Free and bound variables and Sigma notation;
Orders of growth and O() notation;
Problem-solving heuristics;
Verbal skills and argumentation in written and oral mathematics.