Math 114 Calculus, Part II

Functions of several variables, vector-valued functions, partial derivatives and applications, double and triple integrals, conic sections, polar coordinates, vectors and vector calculus, first order ordinary differential equations. Applications to physical sciences. Use of symbolic manipulation and graphics software in calculus.

Text: *Thomas' Calculus Early Transcendentals Custom Edition for the University of Pennsylvania* Pearson 2018. Package ISBN : 3 Semester access 978-0134786254 or 1 Semester access 978-0135901410

Section	Title	Core Problems
12.1	Three-Dimensional Coordinate Systems	5, 19, 25, 36, 47, 54, 65.
12.2	Vectors	1, 11, 20, 24, 25, 35, 45, 49, 53.
12.3	The Dot Product	3, 11, 19, 26, 29, 43, 50.
12.4	The Cross Product	5, 9, 15, 21, 26, 27, 31, 37, 44, 50.
12.5	Lines and Planes in Space	5, 15, 23, 29, 35, 43, 57, 62, 67, 70, 77.
11.6+12.6	Conic Sections, Cylinders and Quadric Surfaces	Section 11.6: 5, 6, 7, 8, 9, 21, 34, 70. Section 12.6: 1 - 12, 17, 25, 27, 32, 46.
13.1	Curves in Space and Their Tangents	5, 11, 15, 22, 26, 38, 42.
13.2	Integrals of Vector Functions; Projectile Motion	1, 13, 22, 25, 34, 37, 41.
13.3	Arc Length in Space	5, 12, 17, 19.
13.4	Curvature and Normal Vectors of a Curve	3, 7, 12, 19, 24.
13.5	Tangential and Normal Components of Acceleration	2, 5, 8, 9, 17, 21, 26, 28
13.6	Velocity and Acceleration in Polar Coordinates	3, 8, 12.
14.1	Functions of Several Variables	3, 9, 14, 18, 31, 32, 33, 34, 35, 36, 39, 50, 55, 62, 65.
14.2	Limits and Continuity in Higher Dimensions	1, 9, 16, 27, 32, 41, 49, 60, 65.
14.3	Partial Derivatives	5, 22, 26, 39, 46, 58, 69, 75, 83, 93, 100.
14.4	The Chain Rule	3, 7, 12, 14, 25, 33, 37, 47, 51, 56, 59.
14.5	Directional Derivatives and Gradient Vectors	3, 8, 13, 21, 26, 29, 34, 39.
14.6	Tangent Planes and Differentials	3, 11, 17, 21, 26, 31, 35, 44, 49, 51, 56, 60
14.7	Extreme Values and Saddle Points	2, 17, 31, 41, 44, 49, 59, 67.
14.8	Lagrange Multipliers	5, 11, 20, 29, 31, 42, 43.

Section	Title	Core Problems
15.1	Double and Iterated Integrals over Rectangles	1, 14, 21, 24, 29.
15.2	Double Integrals over General Regions	1, 9, 19, 26, 35, 51, 57, 67, 71, 73, 78, 84.
15.3	Area by Double Integration	3, 16, 19, 25.
11.3+15.4	Polar Coordinates and Double Integrals in Polar Form	Section 11.3: 17, 23, 25. Section 15.4: 4, 15, 23, 33, 39, 45, 46.
15.5	Triple Integrals in Rectangular Coordinates	3, 9, 21, 23, 39, 43, 47.
15.6	Moments and Centers of Mass	1, 4, 8, 13, 22, 29.
15.7	Triple Integrals in Cylindrical and Spherical Coordinates	23, 31, 36, 43, 50, 56, 67, 81, 90, 100.
15.8	Substitutions in Multiple Integrals	1, 5, 11, 23, 26.

16.1	Line Integrals	9, 11, 14, 19, 22, 25.
16.2	Vector Fields and Line Integrals	2, 7, 10, 19, 20, 27.
16.3	Path Independence, Conservative Fields, and Potential Functions	1, 4, 19, 20, 27, 28, 30 a and c.
16.4	Green's Theorem in the Plane	10, 13, 15, 17, 25, 33, 34.
16.5	Surfaces and Area	4, 7, 8, 19, 23, 37, 41, 47.
16.6	Surface Integrals	2, 3, 7, 14, 17, 38, 39.
16.7	Stokes' Theorem	9, 12, 13, 19, 25.
16.8	Divergence Theorem	9, 12, 13, 15, 19, 32.

SAMPLE EXAM QUESTIONS also form a part of the core, they are available from the Math Dept's Math 114 Web Page:

https://www.math.upenn.edu/undergraduate/calculus-homepages/calculus/mathematics-114

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 114 have a COMMON FINAL EXAM