

Math 225– Fall 1996– J. Derwent

Text: Calculus, by Finney and Thomas, Addison-Wesley, 1990, Chapters 11-15.

1. Vectors and analytic geometry in space. The dot and cross product. Lines, planes and central quadrics. Cylindrical and spherical coordinates.
2. Vectors valued functions and motion in space. Derivatives and integrals. Projectile motion. Arclength. The unit tangent, the unit normal, and the curvature.
3. Double and triple integrals, change of order of integration, and calculation. Moments and centers of mass. Triple integrals in cylindrical and spherical coordinates.
4. Vector fields. Various kinds of line integrals. Flux integrals. Green's theorem. Surface integrals. Stokes's Theorem and the Divergence Theorem.

There were also fourteen Mathematica demonstrations and eleven Mathematica assignments.

## 11. Vectors and, Analytic Geometry, in Space

- 11.1 Vectors in the Plane 691
- 11.2 Cartesian(Rectangular) Coordinates  
and Vectors in Space 700
- 11.3 Dot Products 710
- 11.4 Cross Products 718
- 11.5 Lines and Planes in Space 724
- 11.6 Surfaces in Space 731
- 11.7 Cylindrical and Spherical Coordinates 741  
*For Your Review* 746  
*Practice Exercises* 747

$4\frac{1}{2}$  classes

## 12. Vector-Valued Functions

- 12.1 Vector-Valued Functions and Space Curves 751
- 12.2 Modeling Projectile Motion 762
- 12.3 Arc Length and the Unit Tangent Vector T 771
- 12.4 Curvature 776  
*For Your Review* 795  
*Practice Exercises* 795

$5\frac{1}{2}$  classes

Test 1 – one class

## 13. Partial Derivatives

- 13.1 Functions of Several Independent Variables 799
- 13.2 Limits and Continuity 808
- 13.3 Partial Derivatives 814
- 13.4 Differentiability, Linearization 823

3 classes

13.5	The Chain Rule	833	
13.6	Directional Derivatives, Gradient Vectors, and Tangent Planes	841	
13.7	Maxima, Minima, and Saddle Points	853	6 classes
13.8	Lagrange Multipliers	864	
	<i>For Your Review</i>	873	
	<i>Practice Exercises</i>	873	

## 14. Multiple Integrals

14.1	Double Integrals	877	
14.2	Areas, Moments, and Centers of Mass	887	5 classes
14.3	Double Integrals in Polar Form	893	Test 2
14.4	Triple Integrals in Rectangular Coordinates	899	1 class
14.5	Masses and Moments in Three Dimensions	906	
14.6	Triple Integrals in Cylindrical and Spherical Coordinates	910	3 classes
14.7	Substitutions in Multiple Integrals	919	
	<i>For Your Review</i>	927	
	<i>Practice Exercises</i>	927	

## 15. Integration in Vector Fields

15.1	Line Integrals	931	5 classes
15.2	Vector Fields, Work, Circulation, and Flux	937	Test 3
15.3	Path Independence, Potential Functions, and Conservative Fields	946	1 class
15.4	Green's Theorem in the Plane	954	
15.5	Surface Area and Surface Integrals	965	
15.6	Parametrized Surfaces	975	7 classes
15.7	Stokes's Theorem	983	
15.8	The Divergence Theorem	993	
	<i>For Your Review</i>	1001	
	<i>Practice Exercises</i>	1001	