18.02 | Fall 2007 | Undergraduate

Multivariable Calculus

Calendar

I. Vectors and matrices		
0	Vectors	
1	Dot product	
2	Determinants; cross product	
3	Matrices; inverse matrices	
4	Square systems; equations of planes	Problem set 1 due
5	Parametric equations for lines and curves	
	Velocity, acceleration	
6	Kepler’s second law	
7	Review	Problem set 2 due
	Exam 1 (covering lectures 1-7)	
II. Partial derivatives		
8	Level curves; partial derivatives; tangent plane approximation	
9	Max-min problems; least squares	Problem set 3 due
10	Second derivative test; boundaries and infinity	
11	Differentials; chain rule	
12	Gradient; directional derivative; tangent plane	Problem set 4 due
13	Lagrange multipliers	
14	Non-independent variables	
15	Partial differential equations; review	Problem set 5 due
	Exam 2 (covering lectures 8-15)	
III. Double integrals and line integrals in the plane		
16	Double integrals	Problem set 6 due
17	Double integrals in polar coordinates; applications	
18	Change of variables	
19	Vector fields and line integrals in the plane	Problem set 7 due
20	Path independence and conservative fields	
21	Gradient fields and potential functions	
22	Green’s theorem	Problem set 8 due
23	Flux; normal form of Green’s theorem	
24	Simply connected regions; review	
	Exam 3 (covering lectures 16-24)	Problem set 9 due
IV. Triple integrals and surface integrals in 3-space		

25	Triple integrals in rectangular and cylindrical coordinates	
26	Spherical coordinates; surface area	
27	Vector fields in 3D; surface integrals and flux	Problem set 10 due
28	Divergence theorem	
29	Divergence theorem (cont.): applications and proof	
30	Line integrals in space, curl, exactness and potentials	
31	Stokes' theorem	Problem set 11 due
32	Stokes' theorem (cont.); review	
	Exam 4 (covering lectures 25-32)	
33	Topological considerations Maxwell's equations	Problem set 12 due
34	Final review	
35	Final review (cont.)	
36	Final exam	