

M311-STUDY GUIDE

1. Determine equations for lines and planes . Problems: p. 852.
2. Sketch and identify cylinders and quadric surfaces. Problems: p. 859.
3. Find the domain of a vector function and the equations for a tangent line to a curve. Sketch the graph of a vector function and determine the orientation of the graph. Sketch the vectors $\mathbf{r}(t)$ and $\mathbf{r}'(t)$ for given values of t . Compute derivatives and integrals of vector functions. Find the length of a curve given by parametric equations. Problems: p.876, 882, 889.
4. Sketch the domain and level curves for a function of two variables. Sketch and describe the graphs of functions of two variables. Problems: p. 917.
5. Show that a given limit of a function of two or three variables does not exist. Problems: p. 928.
6. Take partial derivatives of functions of two and three variables. Show that a given function is a solution to the wave equation or Laplace's equation. Problems: p. 939.
7. Find equations for tangent planes. Compute the linearization and the differential of a function of two variables. Show that a function of two variables is differentiable. Problems. p. 950.
8. Use chain rules to find partial derivatives and to prove identities involving partial derivatives. Use partial derivatives to find derivatives and partial derivatives of functions given implicitly. Problems: p. 958.
9. Compute the directional derivative and gradient of a function. Find a vector in the direction in which a function increases most rapidly at a given point. Find the maximum rate of increase or decrease. Find equations for tangent planes and normal lines. Problems: p. 970.
10. Find maxima, minima, and saddle points by use of the second derivative test and the Lagrange multiplier method. p. 981, 990.
11. Set up and evaluate double integrals. Use double integrals to find volume and area. Problems: p. 1022.
12. Express double integrals in terms of polar coordinates and evaluate the resulting integral. Problems: p.1028.

13. Set up and evaluate triple integrals. Use triple integrals to find the volume of a solid. Problems: p. 1050.
14. Set up and evaluate triple integrals in cylindrical and spherical coordinates. Problems: p. 1057.
15. Sketch vector fields and find the gradient vector field of a function. Problems: p.1080.
16. Evaluate line integrals. Use a line integral to calculate work done. Problems: p.1091.
17. Determine if a vector field is conservative and, if it is, find a potential function for the vector field. Use the Fundamental Theorem of Line Integrals to evaluate line integrals. Determine if a line integral is independent of path. Problems: p. 1100.
18. Use Green's Theorem to evaluate line integrals. Problems: p. 1108.