MTH 236 Calculus IV Final Question Guide

Monday, April 27th 1:00 p.m. ***You may bring in one hand-written page (8.5x11) -- both sides -- of notes to use. It must be your own writing.***

Final Exam counts 25% of your grade. If you achieve a higher grade on the final than your lowest grade on any one of the three hourly exams, the final exam grade will also replace that one low grade.

Chapter 12: Vector Valued Functions

1. Given the derivative of **r**(t) and initial condition **r**(t_0), find **r**(t). (**T1 #3**)
2. Give the rectangular coordinates for a plane curve represented by a vector-valued function and sketch its graph. (**T1 #2**)
3. Given a position function, calculate: (**T1 # 5**)
   - Velocity vector function v(t)
   - Speed at time t
   - Acceleration vector a(t)
   - Unit tangent vector T(t)
   - Principal unit normal vector N(t)
   - Arc length over an interval for t
4. Give the equation for the position function r of an ideal projectile launched from the origin. Calculate the range and time when it hits the ground, calculate the maximum height of the projectile. (**T1 #4**)

Chapter 13: Functions of Several Variables.

1. For a function of two or more variables, calculate the partial derivatives. (T2 #11a)
2. Use the chain rule to calculate derivatives of composite functions of several variables. (T2 #6, #7)
3. At a given point, calculate gradient vector, directional derivative, direction of greatest increase and decrease, maximum directional derivative (maximum rate of change). (T2 #8)
4. Calculate the equation of the tangent plane and parametric equations of the normal line at a given point to a surface given by F(x,y,z) = 0. (T2 #10)
5. Given a function of two variables (a surface), calculate the critical points and determine which if any are maximums, minimums, or saddle points. (T2 # 11)
6. Use Lagrange multipliers to determine the maximum or minimum of a function of several variables subject to a constraint. (T3 #1, #2)

Chapter 14: Multiple Integration

1. Given a region and a function of two variables, set up the limits of integration and integrate the function over that region. (T3 #3, #4)
2. Set up and evaluate a polar coordinate double integral. (May be a conversion from rectangular to polar.) (T3 #6)
3. Find the volume of a solid by setting up and evaluating the appropriate double integral. (T3 #4)
4. Set up and evaluate the appropriate double integral to find surface area. (T3 #9)

*5. Use a triple integral to calculate the volume and center of mass of a solid region (Example 2, page 1026, Problems 16, 23, 35 page 1032).

*6. Find the volume of a solid using cylindrical coordinates or convert an integral from rectangular to cylindrical coordinates and spherical coordinates (Example 1, page 1036, Example 4, page 1039, and problems 13, 15, 16, 17, 19, page 1040).

The * indicates these were covered since the last test.