

## Math 2210-5      Review for Exam 2

Below is a list of problem. These are the types of problems you might see on the exam. Certainly, not all of these problems will appear on the exam (there isn't enough time for that); and it is entirely possible that a problem will appear on the exam which does not fit into any of these types. I **will** allow a single page of notes for Exam 2. This exam will cover Chapters 15 and 16, as well as some material from section 14.7.

1. Interpret the physical meaning of several partial derivatives of first- or second-order.
2. Use the Chain Rule to compute partial derivatives, or change coordinates.
3. Show that a particular function satisfies a given Partial Differential Equation.
4. Find all local extreme values of a function on a closed region.
5. Understand the three types of critical points: stationary, singular, and boundary.
6. Classify all critical points of a function as maxima, minima, or saddle points:
  - (a) Using the 2nd-Derivative Test;
  - (b) Using alternate methods (for instance when the 2nd-Derivative Test is inconclusive).
7. Use Lagrange's Method to solve constrained optimization problems.
8. Use geometry to estimate the value of  $\int_R f dA$  for a given function,  $f$ , and a given region,  $R$ .
9. Set up  $\int_R f dA$  as an iterated integral in either Cartesian or polar coordinates.
10. Compute  $\int_R f dA$ :
  - (a) in Cartesian coordinates;
  - (b) in polar coordinates;
  - (c) by reversing the order of integration;
  - (d) using geometry.
11. Compute the area of a region  $R$ .
12. Compute the average value of  $f$  over the region  $R$ .
13. Set up  $\int_W f dV$  as an iterated integral in Cartesian, Cylindrical, or Spherical coordinates.
14. Compute the volume of a region,  $W$ .
15. Compute  $\int_W f dV$