

# Math 231, Section U1

## Final Exam Checklist

### Introduction

This is an outline of material I expect you to know for the Final. It is not guaranteed to be comprehensive, and details are omitted, but it should give you a good idea of what to concentrate on. Problems from the quizzes, examples in class and the problems from the homework should also give you a good idea of what material will be covered on the test. I recommend looking at the "writing exercises" in addition to the problems, as they will help you understand the concepts. Also check out the relevant chapter review exercises. To prepare for the test, you should get lots of practice and be sure you understand why you are doing what you are doing! Get help ASAP if you need it.

### Background

Math is cumulative. I expect you to remember and understand all the relevant background material, from this class, from Calc I and before.

### Chapter 6, Section 7.1, Chapter 8 and 9.1-9.3

Use the three previous Exam Checklists, plus what is mentioned below.

### Section 8.8: Applications of Taylor Series

In addition to the old checklist, know what the Binomial Series is and how to use the formula.

### Section 9.4: Polar Coordinates

- be able to convert from polar coordinates to rectangular (cartesian) coordinates, and understand that there is more than one set of polar coordinates for any given point in the plane
- be able to convert an  $xy$ -equation to a polar one and vice versa
- be able to sketch curves given by polar equations
- know what roses, limacons, and cardioids are

### Section 9.5: Calculus with Polar Coordinates

- know how to find the points of intersection of polar curves
- know how to find the slope of the tangent line to a polar curve at a given point, and how to use this to find the locations of horizontal and vertical tangents
- be able to derive the formula for the slope of the tangent line to a polar curve from the formula for the slope of the tangent line to a curve given by parametric equations (this is done in the first several paragraphs of the section, and we did it in class.)
- understand the formula for the area of a polar region (given just before Example 5.3) and understand generally how it was derived (you may want to review Riemann sums)

- know how to find the area of regions in the plane bounded by polar curves
- know how to find the arc length of a polar curve

### **Section 9.6: Conic Sections**

- know the definitions of the conic sections in terms of distances to points and lines
- be able to find the equations of conic sections as in homework problems 1-12
- given an equation which describes a conic section, be able to identify what kind of conic section it is (parabola, circle, ellipse, hyperbola), be able to identify the features of the conic section (depending on what kind of conic section it is, it may have foci, vertices, a directrix, asymptotes etc) and be able to sketch the conic section as in homework problems 13-24
- be able to answer questions using the definitions of conic sections as in homework problems 25-30
- be able to answer questions about the applications of conic sections as in homework problems 31-44