

Math 2300: Calculus II, Fall 2005; Instructor: Dana Ernst

Review for Midterm Exam 2

Here is a review for your upcoming exam. The exam covers sections 7.5-7.8 and 9.2-9.5. I will not collect this. Do what you want with it. This review will give you a good indication of what you will be expected to know for the exam.

The following is a list of topics that you should know and understand. For each section, I have included some problems that would be helpful to work on as part of your studying.

7.5 Partial fractions. You use this technique if you have a rational function where the denominator factors. If the degree of the numerator is greater than or equal to the degree of the denominator, then you want to do long division first.

Problems: #3, 5, 7, 11, 13, 15, 17, 19

7.6 Trigonometric substitution. This technique can (and sometimes should) be used when integrands contain algebraic expressions involving $a^2 - u^2$, $u^2 - a^2$, and $a^2 + u^2$. You are responsible for memorizing which trig function should be used when doing the substitution. The trick is that you want to see a familiar trig identity after doing the substitution.

Problems: #1, 3, 9, 11, 19, 25, 29, 31

7.7 This section deals with integrating functions that contain irreducible quadratics (not factorable over the integers). The main idea here was to complete the square. In the case where you are given a rational function where the denominator contains an irreducible quadratic and the numerator is not just a constant, you need to split the integral into 2 integrals (we "make" u -sub work in the first integral and we complete the square in the second integral).

Problems: #1, 3, 5, 7, 12, 19

7.8 Convergence and divergence of the two types of improper integrals: infinite limits and infinite discontinuities on the interval of integration. L'Hospital's rule can be useful here.

Problems: #5, 7, 13, 19, 23, 25, 33

9.2 Introduction of polar coordinates. You should memorize the formulas for converting back and forth between polar and rectangular. Recognizing polar equations for circles, cardioids, lemniscates, and rose-type graphs would be very useful. Either way, you should be able to sketch graphs of polar equations and be able to find points of intersection of two different polar equations.

Problems: #1(a)(b), 2(a)(b), 7, 13, 39, 41, 43, 47, 53

9.3 Area of regions bounded by polar graphs. Memorize the appropriate formulas.

Problems: #7, 19, 25, 29

9.4 Introduction of parametric curves. You should be able to eliminate parameter to convert to rectangular form. You should also memorize the formulas for the first and second derivatives of smooth parametric curves and be able to evaluate them at a specified point.

Problems: #5, 7, 17, 19, 25, 27

9.5 Integral computations with parametric curves. Be able to find area under a curve, volume of revolution, arc length, and area of a surface of revolution. In addition, memorize the appropriate formulas.

Problems: #1, 3, 7, 11, 19

Other suggestions: Look over your homework assignments! Also, spend some time quizzing yourself on what technique of integration you would use on different problems. Lastly, don't forget:

Midterm Exam 2: Wednesday, October 5th, 5:15–6:45 PM, Location TBA