Test 3 Study Guide

To review for Test 3, you should know the things mentioned in the chapter summary and key terms for chapter 7 (pp. 448–450) and chapter 8 (p. 492). I will not test you on consumers’ or producers’ surplus. Please remember that you can use differentiation to check your integration. For instance, if you get \( g(x) = \int f(x) \, dx \), then \( g'(x) \) should be \( f(x) \).

You should also know how to work problems involving the following concepts. For (almost) every item, there are a number of practice problems suggested which will help you review the item. Unless noted, the problem numbers refer to problems in the Chapter Review sections at the end of the chapter.

Chapter 7

1. Find the indefinite integral, or antiderivative, of a function, using standard antiderivatives or substitution (see 5–24). Remember to add +C.

2. The definite integral. You should know the definition of the definite integral \( \int_{a}^{b} f(x) \, dx = \lim_{n \to \infty} \sum_{i=1}^{n} f(x_i) \Delta x \). More importantly, you should know what each part means and how we come up with that as the formula of the definite integral. You should know how to use the definite integral to find the areas under functions or between functions. Please remember that the definite integral doesn’t always exactly correspond to area. You will not need to use the definition of the integral to actually calculate the definite integrals—you can use the Fundamental Theorem of Calculus or geometry for that. Please remember that if you use substitution, you make sure that you use the correct limits for the variable in the problem. You should also be familiar with the properties of definite integrals given in the green box on page 419 and know how to apply them. See problems 26, 31–47. See also p. 412, 17–20.

3. Rates of change/Total change. If you are given a rate of change function, you should know how to get the actual function using an indefinite integral and using known information to solve for the constant (see, for instance, 56–57; see also pp. 402–403, problems 37–43 and p. 392, problems 43–44). If you are given a rate of change function, you should know how to calculate the total change over a given interval using a definite integral (see 58–61, 63–65, 69–70).

4. Fundamental Theorem of Calculus. You should know what the theorem is (see the Chapter summary) and how to calculate integrals using it.

5. Numerical integration. You should know how to approximate an integral using left, right, and trapezoid rules. You should also know how to calculate the Simpson’s rule approximation, but I will give you the formula. You need to be familiar with the ideas behind each approximation method and when the trapezoid methods give you overestimates or underestimates of the actual area. You should also know when each rule will give you the exact area. You should be able to approximate the area under a function if you are only given specific points of the function instead of the actual function. See problems 27, 28, 48–55. See also Example 3 on page 444 and problems 21-22 on page 446 and problems 31-32 on page 448.
Chapter 8

1. Integration by parts. You should know how to calculate an integral using integration by parts. While you don’t need to know how to do this by the column method, I would highly suggest you learn the column method as it makes some of the integrals a lot easier. See problems 4–13.


4. Continuous money flow. You should know how to calculate the total money flow, the present value of a money flow, and the accumulated amount of money flow at a particular time. You should know and understand the formulas to compute these as well (I will not be giving them to you on the test). See problems 34–45.

5. Improper integrals. You should know how to calculate an integral if one or both of the limits are infinite. You should know how to calculate the capital value of an asset as well (see example 4 on p. 489 and problem 46 on p. 494). See problems 26–33.