Math 140

Exam on Chapter 4 Information

What you should know:

- How to find an antiderivative. You need to know formulas 1, 2, 3, 4, 8, 9, 14, and 16 inside the front cover of your book. Plus the power rule for integrals: \( \int x^n \, dx = \frac{x^{n+1}}{n+1} + C \) for \( n \neq -1 \)
- You need to know how to evaluate a sum, plus memorize the following two summation formulas:
  \[ \sum_{i=1}^{n} c = cn \quad \text{and} \quad \sum_{i=1}^{n} i = \frac{n(n+1)}{2} \]
- You should know how to approximate the area under a curve using a given number of rectangles, both the upper and lower sums. Something similar to example 4 on page 259 in your book.
- If you are told to find an upper sum, or a lower sum, or just told to approximate the area, know that you are using the formula: \( \sum_{i=1}^{n} f(c_i) \Delta x \). For an upper sum, \( c_i \) should give the maximum value of \( f(x) \) on each subinterval. For a lower sum, \( c_i \), should give the minimum value of \( f(x) \) on each subinterval. Just to approximate the area, it is easiest to let \( c_i = a + i \Delta x \) be the right endpoint.
- If you are told to use the limit definition to find the area of a region then you need to know to use:
  \( \lim_{n \to \infty} \sum_{i=1}^{n} f(c_i) \Delta x \). Once again, it is usually easiest to use the right-endpoint approximation, where \( c_i = a + i \Delta x \).
- Know how to write a definite integral that represents the area of a region.
- Know how to use the properties of the definite integral. They are listed in the two boxes on page 271 (the definition box and theorem 4.6) and the one box on page 272 (theorem 4.7).
- Make sure you know the Fundamental Theorem of Calculus!
- Make sure you know how to use the Fundamental Theorem of Calculus!
- Make sure you know (and notice) the difference between an indefinite integral (outputs a family of functions) and a definite integral (outputs a number). This is a big deal and you don’t want to get this wrong on the exam.
- I will give you the Mean Value Theorem for Integrals on the test, as well as the Average Value formula. Just make sure you know how to use them.
- Make sure you know the Second Fundamental Theorem of Calculus!
- Know how to evaluate an indefinite integral using a u-substitution when needed.
- Know how to evaluate a definite integral using a u-substitution.
- Section 4.6 will NOT be on this exam, or on the final exam. It is covered on the last 3 labs.

Review Problems

On pages 312 through 341 in your book is the Chapter 4 Review. I suggest you be able to do the following problems.

Do problems: 1-33 odds, 37-71 odds, and 75-85 odds.