

Mathematics 122: Review for Test 3

The sections of the book we have covered since the last exam are all of Chapter 3 parts of Chapter 5 dealing with derivative formulas. Note however that mathematics is cumulative so that you are still expected to know the material from the earlier exams. As a first step toward studying for the test make sure you can do tall the problems on the quizzes since Test 2 (These are quizzes 20–25. If you missed or lost one they can be found on the class homepage <http://www.math.sc.edu/~howard/Classes/122b/>. The exams I gave last time I taught the class can be found at <http://www.math.sc.edu/~howard/Classes/122/>.)

1. We informally introduced the integral as accumulated change (§3.1 of text) and saw that distance traveled is the area under the area under the velocity curve. Good practice problems are

- Pages 149–151 1, 2, 3, 7, 9; Page 193 9; Quiz 23

2. We then gave a more of less precise definition of the integral $\int_a^b f(x) dx$ valid for any function (see §3.2 of text) and learned how to compute integrals with our calculators. There will be several problems where you will have to compute integrals by use of the calculator. Good practice here is

- Pages 160–161 1–12; Quiz 21 (this includes giving upper and lower estimates for an integral) While practicing computing integrals review the definition of average value (§3.4 of text) and be sure you can compute averages. Look at

- Quiz 22; Pages 174–175 1, 2, 2, 4, 7.

3. We also gave several interpretations and applications of the definite integral. In particular know that

$$\text{Units of } \int_a^b f(x) dx = (\text{units of } f(x)) \times (\text{units of } x).$$

Practice here is

- Pages 183–184, 1–9 (We did these in class so the answers are in your notes.)

4. We also found that rates of change (derivatives) are related to integrals by

$$\int_a^b (\text{rate of change}) dt = \text{total change}.$$

That is if $F'(t) = f(t)$ (so that $f(t)$ is the rate of change of F) then

$$\int_a^b f(t) dt = F(b) - F(a).$$

This is the *fundamental theorem of calculus*. Look at

- Pages 191–192 1, 7.

5. There will be several problems involving the derivative rules.

- Quizzes 24 and 25; Page 248 3, 4, 11, 19; Page 291 6, 8, 11; Page 309. 1–17; and the following

6. Various and sundry surprise mystery problems.