

## Math 265A: Test # 5 REVIEW

### Review problems:

Chapter 5 Review, page 291: 4, 5, 6 (on 6, find the LHSum and the RHSum and average them), 9, 11 (sketch a graph to help you solve #11!), 15, 17 (on #17, use your calculator to evaluate the definite integral), 25, 26, 35ab (use your calculator to evaluate the integral in part (b)), 37, 41, 42 (on 42, note that the integrand is just a linear function, i.e.  $y = mx + b$ , so figure out b and m and sketch a graph! Verify your result using the FTC), 47

- Also review problems # 1 and #25 in section 5.2

Chapter 6 Review, page 325: 3 – 37 odd, 41, 47, 51, 52 (ans: 93 cubic meters), 55, 59, 63, 71, 73

- Also review problems #5, and #15 in section 6.1 and #3 in section 6.4

### Even answers for Chapter 5 Review:

#4 A bit less than 60 (based on counting the “squares” each with an area of 4 unit<sup>2</sup>)

#6:  $\text{LHSum} = \sum_{k=0}^4 f(t_k)\Delta t = (17.8) \cdot 20 = 356$ ;  $\text{RHSum} = \sum_{k=1}^5 f(t_k)\Delta t = (21.8) \cdot 20 = 436$ ; so  $\int_0^{100} f(t)dt \cong 396$

#26: The triangles formed by the graph and the x-axis (between  $x = -1$  and  $x = 1$ ) have total area of 1, so

$$\int_{-1}^1 |x| dx = 1$$

#42:  $\int_0^w b_1 + \frac{b_2 - b_1}{w} x dx = b_1 w + \frac{1}{2}(b_2 - b_1)w = \frac{1}{2}b_2 w + \frac{1}{2}b_1 w$

### Concepts and Skills:

- Estimate a distance traveled by analyzing a velocity function. The velocity function may be given as a table of data, as a graph or as a function formula.
- Given a function, estimate the value of a definite integral  $\int_a^b f(x)dx$  in the following ways:
  - Numerically:
    - Given a table of data, find a Left Hand Sum or Right Hand Sum
    - Construct a table of data, based on a given number of subdivisions (rectangles) and use the table to find the LHSum and RHSum. (Know the summation formulas for the RHSum and LHSum)
  - Graphically: Be able to illustrate the LHSum and the RHSum on a graph of  $y = f(x)$  and find the value of each.
  - Using a calculator: Be able to use your calculator to find the value of a definite integral
  - Analytically: Use the Fundamental Theorem of Calculus, i.e., find and evaluate the antiderivative of  $y = f(x)$

- Know and apply the properties of definite integrals

- Reverse the limits of integration:  $\int_b^a f(x)dx = -\int_a^b f(x)dx$

- Break up the interval:  $\int_a^c f(x)dx = \int_a^b f(x)dx + \int_b^c f(x)dx$

- Interpret a definite integral as an area, both above and below the x-axis.
- Interpret a definite integral as a net accumulation of some quantity, given the rate of change of that quantity, including finding units.
- Find the average value of a function
  - know the formula  $f_{avg} = \frac{1}{b-a} \int_b^a f(x)dx$
  - use the FTC to find  $f_{avg}$
  - use areas to estimate  $f_{avg}$
- Find antiderivatives of basic functions using the rules of integration
- Construct the graph of an antiderivative from the graph of a function. Use the Second Fundamental Theorem of Calculus to construct a table of values for this antiderivative.