

## Math 0100: Introductory Calculus II Practice Midterm II

What follows is what I believe to be a reasonable practice midterm, focusing on material from sections 7.7, 7.8, 8.1, 8.3, and 9.3. I should note that I had not seen any draft of the actual midterm before constructing this, and so the relative ease or difficulty of this test should not necessarily be an indicator of the relative ease or difficulty of the actual midterm.

I advise that you study material before trying this practice exam, and then take this under timed, test-conditions (no book, no calculator, 50 minutes). This practice exam needs to be used along with, and not in place of, review to be an effective study tool.

1) Use Simpson's Rule with  $n = 4$  to estimate the following integral. Compute a bound for the error.

$$\int_{-2}^2 x^4 + x \, dx$$

2) Show that the following integral is convergent or divergent. If convergent, evaluate.

$$\int_1^{\infty} \frac{x + \sqrt{x}}{x^{3/2}} \, dx$$

3) Find the length of the curve  $e^x = \sec y$  for  $0 \leq y \leq \pi/4$  using either

$$\int \tan \theta \, d\theta = \ln |\sec \theta| + C \quad \text{or} \quad \int \sec \theta \, d\theta = \ln |\tan \theta + \sec \theta| + C$$

4) Find the centroid of the region bounded by the given curves:

$$y = x^2, \quad y = -x^2 \\ x = 2$$

5) Find an explicit solution to the differential equation

$$(1+x)^{-1} \frac{dy}{dx} = -y$$

with the initial condition  $y = 2$  when  $x = 0$ .

6) Evaluate  $\int_0^3 \frac{dx}{x-1}$  if possible.