

Math 125, Sections E and F, Midterm II

May 23, 2013

Name _____

TA/Section _____

Instructions.

- There are 4 questions. The exam is out of 40 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. **Hand in your notes with your exam paper.**
- You may use a calculator which does not graph and which is not programmable. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)
- **Show your work.** If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me. Please BOX your final answer.

Question	points
1	
2	
3	
4	
Total	

1. Evaluate the following integrals.

(a) (5 points) $\int \frac{x^2 + 5x + 7}{x + 1} dx$

(b) (5 points) $\int e^{\sqrt{x}} dx$

2. Given the parametric curve

$$x = \frac{1}{2}t^2 \qquad y = \frac{4}{3}t^{3/2}, \qquad 0 \leq t \leq 4$$

(a) (2 points) Set up an integral to compute the length of the curve.

(b) (5 points) Evaluate it to find the length of the curve.

(c) (3 points) Estimate the same integral in part (a) using Simpson's Rule with $n = 4$.

3. Determine if

$$\int_1^{\infty} \frac{x-1}{x(x+1)(x+2)} dx$$

converges by

(a) (3 points) Using the comparison test.

(b) (7 points) Evaluating the integral.

4. (10 points) You are pulling water out of a 30 meter deep well with a 2 kg leaky bucket tied to the end of a rope which has a mass of 0.4 kilograms per meter. Initially, the bucket scoops 10 kg of water but as you pull it up with a speed of 0.2 m/s, the bucket leaks at a rate of 0.05 kg/s.

(a) When the bucket is y meters from the surface of the water in the well, how much water is left in the bucket? How much water reaches the top of the well?

(b) Find the work done in pulling the bucket to the top of the well. The acceleration due to gravity is 9.8 m/s.