

Math 125, Sections E and F, Fall 2011, Midterm II

November 17, 2011

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.
- You can use any of the integration formulas on page 484 in your textbook. Anything else must be justified by your work.

Question	points
1	
2	
3	
4	
Total	

1. Evaluate the following indefinite integrals.

(a) $\int \frac{\cos(3t)}{1 + \sin^2(3t)} dt$

(b) $\int \frac{2x^2 + 3x + 4}{(x - 1)(x^2 + 9)} dx$

2. Evaluate the following integrals.

$$(a) \int_2^4 \frac{\sqrt{x^2 - 4}}{x^3} dx =$$

$$(b) \int_1^\infty \frac{\ln x}{x^3} dx =$$

3. (a) Use Simpson's Rule with $n = 6$ to approximate the integral

$$\int_0^1 \frac{e^x}{1 + e^x} dx.$$

- (b) Evaluate the same integral exactly and find the percentage error in your Simpson's Rule approximation. Percentage error = $\frac{\text{error}}{\text{actual value}} \times 100$ percent.

4. A tank is formed by rotating the parabola $y = x^2 + 1$ about the y -axis. Water is pumped into this tank from ground level at $y = 0$.
- (a) (7 points) Find the depth of the water h at its deepest point after $24500\pi/3$ Joules of work has been done. The density of water is 1000 kilograms per cubic meter and the acceleration due to gravity is approximately 9.8 meters per second squared.

- (b) (3 points) What is the mass of the water in the tank after this work?