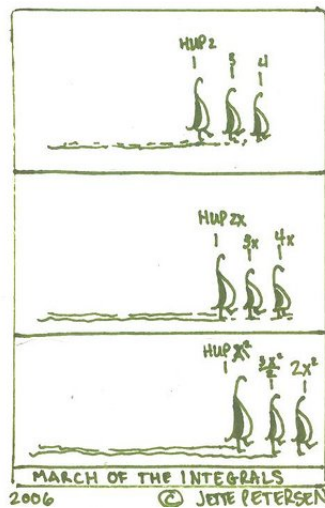


# Math 1271-002 (Calculus 1). Spring 2015.

## Midterm Exam 3

Name: \_\_\_\_\_

1. **Do not open this exam until you are told to do so.**
2. This exam has 6 pages including this cover. There are 5 problems.
3. Not all problems are of equal difficulty, so you may want to skip over and return to a problem on which you are stuck.
4. Do not separate the pages of this exam. If they do become separated, write your name on every page and point this out to your instructor when you hand in the exam.
5. Show an appropriate amount of work for each problem.
6. You may (but do not need to) use a scientific calculator.
7. No notecards are allowed.
8. **No cell phones, smartphones, headphones, or other devices allowed.**



1	
2	
3	
4	
5	
<i>Total</i>	

**Problem 1.** (10 points) Compute the integrals:

a.  $\int_1^4 \left( x^2 + e^{4x} + \frac{1}{1+x^2} \right) dx$

b.  $\int \frac{3x^2 + 2x + 1}{\sqrt{x}} dx$

c.  $\int_{-4}^4 (\sqrt{16-x^2} + xe^{-x^2} + 1) dx$

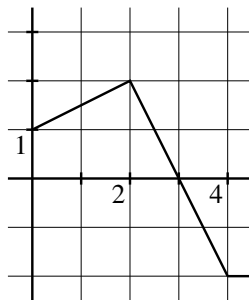
**Problem 2.** (10 points) A rectangular storage container with an open top is to have a volume of  $15 \text{ m}^3$ . The length of its base is twice the width. Material for the base costs \$5 per square meter. Material for the sides costs \$12 per square meter. Find the dimensions of the cheapest such container.

**Problem 3.** Consider the equation  $x^3 + \ln(x) = 3$ . Use Newton's Method with an initial guess  $x_1 = 1$  to compute the next guess  $x_2$ .

**Problem 4.** Evaluate the integral  $\int_0^3 (2x + 1)dx$  using the definition of integral. You may find the following formulas helpful:

$$\sum_{i=1}^n i = \frac{n(n+1)}{2}, \quad \sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}, \quad \sum_{i=1}^n i^3 = \left(\frac{n(n+1)}{2}\right)^2.$$

**Problem 5.** The graph of  $f(x)$  is



Let  $g(x) = \int_0^x f(t)dt$  and  $h(x) = \int_0^{x^2} f(t)dt$

a. Compute  $g(4)$ .

b. Compute  $g'(3)$ .

c. Compute  $h'(2)$ .