

Math 125 - Winter 2011

Exam 1

January 27, 2011

Name: _____

Section: _____

Student ID Number: _____

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- There are 6 questions spanning 4 pages. Make sure your exam contains all these questions.
- You are allowed to use a scientific calculator (**no graphing calculators**) and one **hand-written** 8.5 by 11 inch page of notes.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit. **Put a box around your FINAL ANSWER for each problem and cross out any work that you don't want to be graded.** Give exact answers wherever possible.
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Any student found engaging in academic misconduct will receive a score of 0 on this exam.
- You have 80 minutes to complete the exam. Budget your time wisely.
SPEND NO MORE THAN 15-18 MINUTES PER PAGE!

GOOD LUCK!

1. (12 points) Evaluate the integrals:

(a) $\int x^3 \left(\frac{1}{x^4} - \frac{5}{\sqrt{x^7}} \right) dx$

(b) $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

(c) $\int \frac{x^3}{(1+x^2)^5} dx$

2. (6 pts) If $f(x) = \int_{\sin(5x)}^2 e^t \sqrt{t+3} dt$, find the derivative of $f(x)$ and evaluate it at $x = \pi$.
That is, find the value of $f'(\pi)$.

3. (10 pts) A particle is moving on a straight line with acceleration given by $a(t) = 6t$, where t is in seconds. At $t = 2$ seconds, you measure that the velocity of the particle is $v(2) = -15$.

(a) Find the velocity function, $v(t)$, for the particle at time t .

(b) Find the **total distance** traveled by the particle from $t = 0$ to $t = 5$.

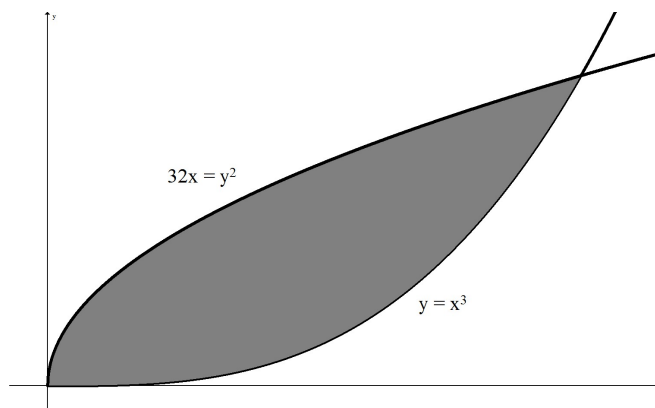
4. Consider

$$\int_1^7 (x^2 + 1)^{1/3} dx$$

- (a) (6 pts) Use the left-endpoint rule with $n = 4$ rectangles to approximate the value of this definite integral. Show your work, then give your final answer rounded to 3 digits after the decimal.

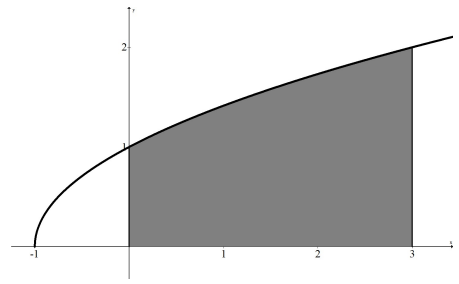
- (b) (2 pt) Is your answer an overestimate or underestimate? (You must explain to get full credit)

5. (8 pts) Find the area of the region bounded by $y = x^3$ and $32x = y^2$.



6. (16 points)

Consider the region, R , bounded by the curve $y = \sqrt{x+1}$, the x -axis, and between $x = 0$ and $x = 3$. A picture of this region is given at right.



(a) (4 pts) Set up an integral (DO NOT EVALUATE) for the volume of the solid obtained by rotating the region R about the **horizontal line** $y = -3$.

(b) (6 pts) Find the volume of the solid obtained by rotating the region R about the x -axis. Set up the integral AND evaluate.

(c) (6 pts) Find the volume of the solid obtained by rotating the region R about the y -axis. Set up the integral AND evaluate.