

# MATH 2250

## Midterm Exam I

September 25, 2014

NAME (please print legibly): \_\_\_\_\_

Your University ID Number: \_\_\_\_\_

Please complete all questions in the space provided. You may use the backs of the pages for extra space, or ask me for more paper if needed. This exam will be graded on:

- Correctness of computations.
- Correctness of procedure.
- Clarity of explanation of procedure.

A correct answer obtained using an incorrect or poorly explained procedure will not be graded for full credit. Please feel free to write as much as you like. Work carefully, and try to complete the problems you find easier before going back to the harder ones.

Your signature above indicates that **you understand the academic honesty policies of the University of Georgia and consent to photography and video recording for academic honesty purposes during the exam period.**

Good luck!

QUESTION	VALUE	SCORE
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
TOTAL	90	

**1. (10 points)** Find the limit

$$\lim_{x \rightarrow -3} \frac{x + 3}{x^2 + 4x + 3}$$

using algebra. (You may use L'Hôspital's rule, if you know it, for half credit.)

ANSWER: \_\_\_\_\_

**2. (10 points)** Find the derivative of the function

$$f(x) = \frac{1}{2x}$$

using the **definition of the derivative as a limit**. (You should use the ordinary differentiation rules – power rule, quotient rule, etc to check your work.)

ANSWER: \_\_\_\_\_

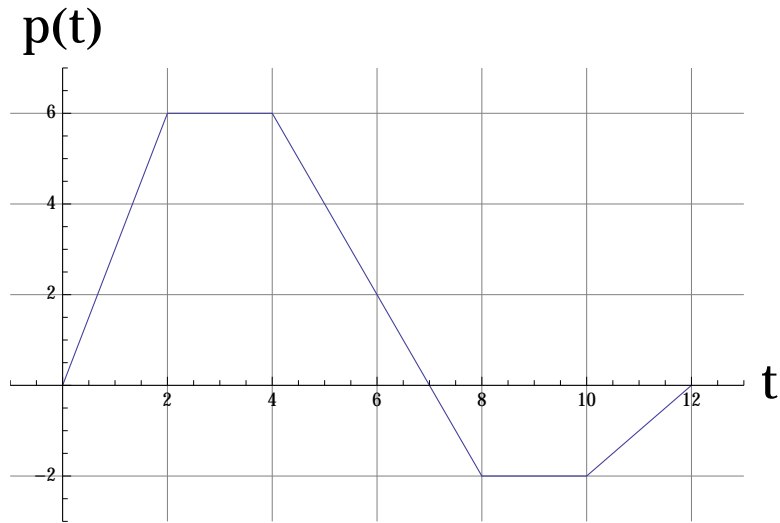
**3. (10 points)** Find the derivative of the function

$$f(x) = x^{\frac{9}{4}} - e^{2x}$$

using any method you like.

ANSWER: \_\_\_\_\_

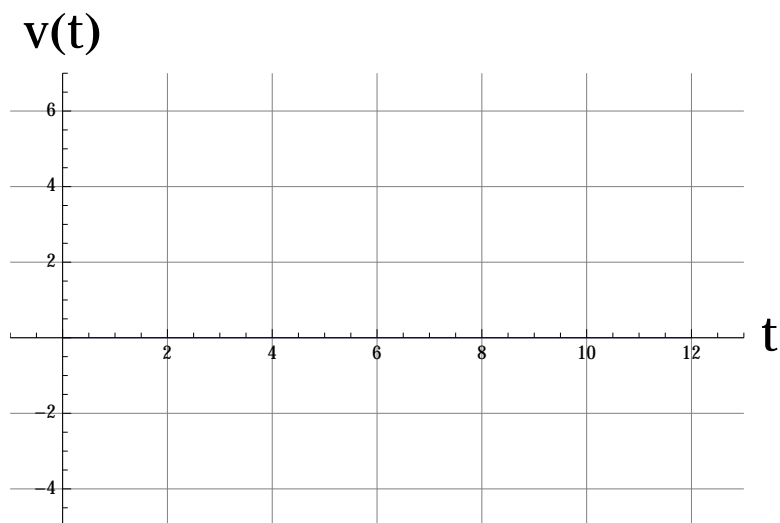
4. (10 points) The  $x$ -position of a particle is given by the function  $x(t)$  graphed below:



Indicate *on the graph above*:

- When the particle is moving right.
- When the particle is moving left.
- When the particle is stopped.

Draw an accurate graph of the  $x$ -velocity of the particle on the axes below.



**5. (10 points)** Find the derivative of

$$q(x) = \frac{\sin x + \cos x}{\cos x}$$

using any method you like.

ANSWER: \_\_\_\_\_

**6. (10 points)** Find the derivative of

$$f(x) = x \tan(2\sqrt{x}) + 7.$$

using any method you like.

ANSWER: \_\_\_\_\_

**7. (10 points)** Find the tangent line to the curve described by the equation

$$y^4 - 4y^2 = x^4 - 9x^2$$

at the point  $(3, 2)$ .

ANSWER: \_\_\_\_\_



**8. (10 points)** Find the derivative of

$$f(x) = \arctan(1/x).$$

ANSWER: \_\_\_\_\_

**9. (10 points)** Use logarithmic differentiation to find the derivative of

$$f(x) = x^x.$$

Bonus (5pts) : Differentiate  $g(x) = x^{(x^x)}$ .

ANSWER: \_\_\_\_\_