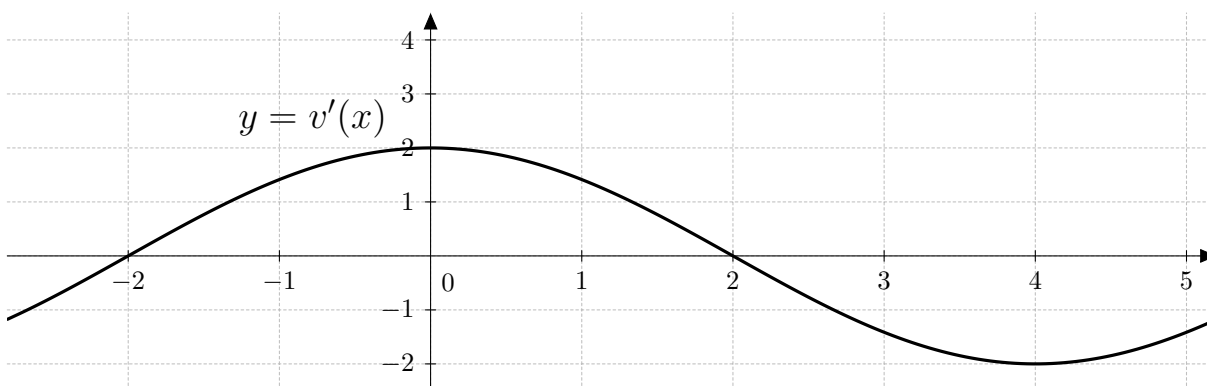


Name \_\_\_\_\_ Signature \_\_\_\_\_

**Math 220    –    Exam 2    –    October 15, 2014**



1. (2 points each)  $y = v'(x)$  is plotted above. Find the following:

A. Interval(s) where  $v(x)$  is increasing: \_\_\_\_\_

B. Interval(s) where  $v(x)$  is decreasing: \_\_\_\_\_

2. (10 points) Let  $q(t) = \frac{1}{t}$ . Using the **limit definition of the derivative**, find  $q'(3)$ .

**3.** (4 points) Suppose that a waiter brings you a cold cup of iced tea. Let  $F(t)$  denote the temperature in degrees Fahrenheit of the tea after  $t$  minutes. Is  $F'(3)$  positive or negative? Explain your answer.

**4.** (6 points) Find  $\frac{d^2}{dx^2}5^x$ .

**5.** The height in feet of a ball  $t$  seconds after being thrown is given by  $h(t) = -16t^2 + 10t + 6$ .

**A.** (4 points) Find the velocity 1 second after the ball is thrown.

**B.** (2 points) Is the ball going upward or downward 1 second after being thrown?

**6.** (9 points) Let  $w(x) = x^{\cos(x)}(x^3 + x)^5$ . Find  $w'(x)$ .

**7.** (9 points) Find  $\frac{dy}{dx}$  for  $x^4 + xy + 2y^3 = 5$ .

8. (7 points each) Find the following derivatives. You do not need to simplify.

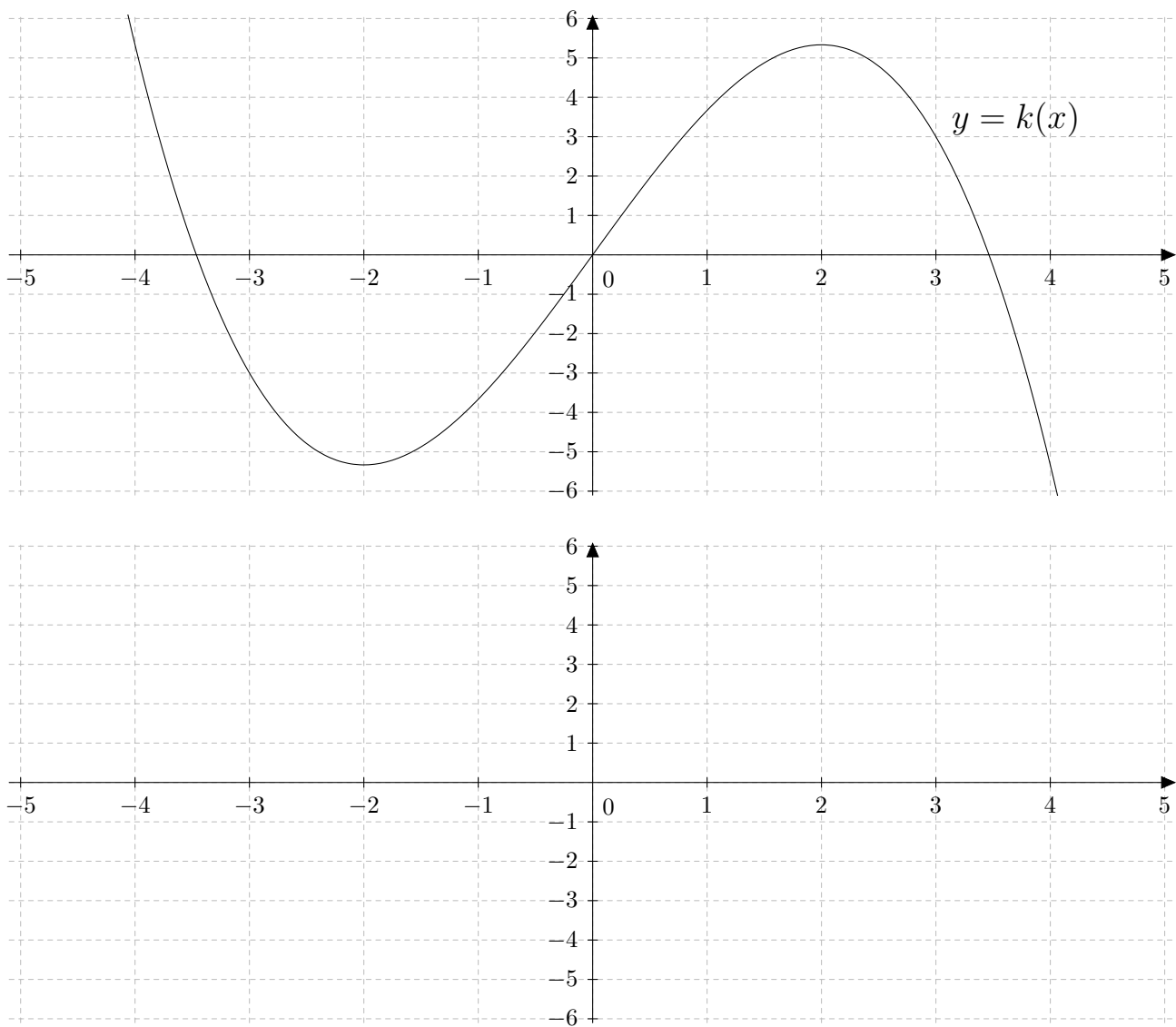
A.  $\frac{d}{dx} (\cos(e^x))$

B.  $\frac{d}{dx} (\ln(x) \cdot \arctan(x))$

C.  $\frac{d}{dx} \left( \frac{\tan(x)}{x^8 + x^4} \right)$

D.  $\frac{d}{dx} (\sin(\cos(\tan(x))))$

9. (8 points) Given the graph of  $y = k(x)$ , sketch the graph of  $y = k'(x)$  in the empty plot below.



10. (8 points) Find the equation of the tangent line to  $y = \cos(x)$  at  $x = \frac{\pi}{2}$ .

- 11.** (8 points) A 5-foot ladder rests against the wall. The bottom of the ladder slides away from the wall at a rate of 2 feet/second. How fast is the top of the ladder sliding down the wall when the bottom of the ladder is 3 feet from the wall?