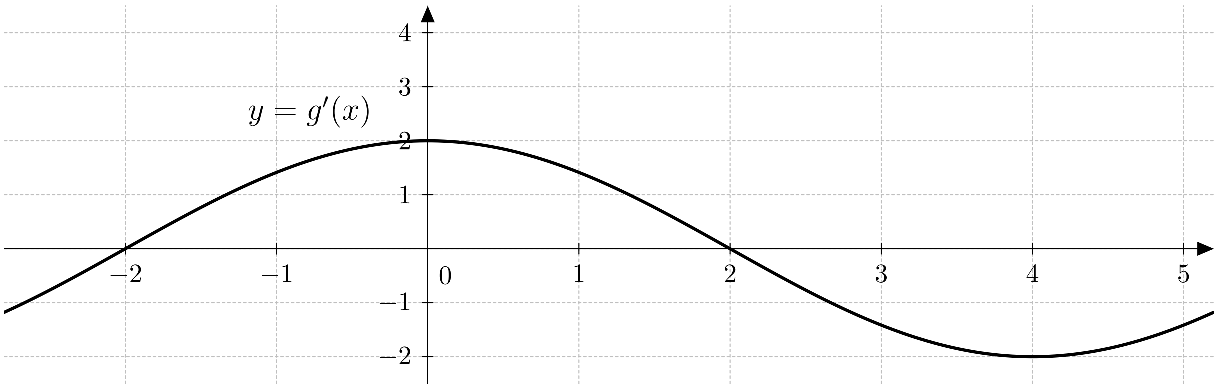
Name ______________________ Signature ______________________

Math 220 – Exam 3 (Version A) – April 17, 2014

1. (12 points) Find the absolute minimum and maximum of $m(x) = x^3 - 3x + 2$ on the interval [0,2].

2. (12 points) What is the smallest perimeter possible for a rectangle of area 4 ft^2? (Explain why your answer corresponds to a minimum.)



3. (2 points each) $y = g'(x)$ is plotted above. Find the following:

A. Interval(s) where $g(x)$ is increasing: ________________

B. Interval(s) where $g(x)$ is decreasing: ________________

C. x-coordinate(s) where $g(x)$ has a local max: ________________

D. x-coordinate(s) where $g(x)$ has a local min: ________________

E. Interval(s) where $g(x)$ is concave up: ________________

F. Interval(s) where $g(x)$ is concave down: ________________

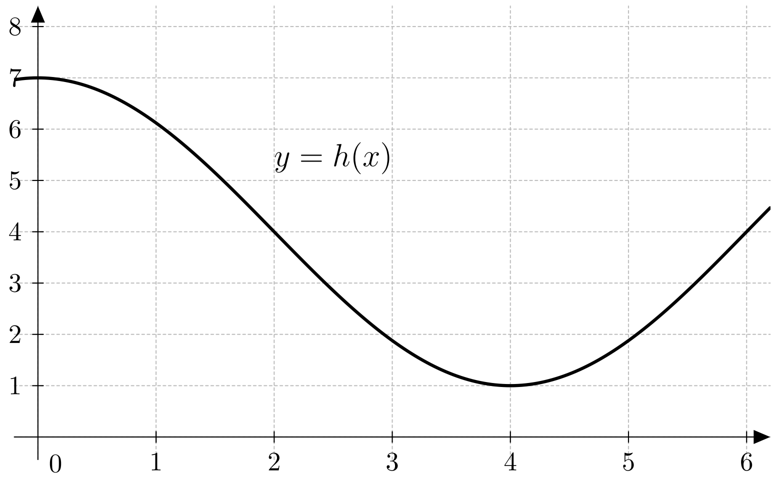
G. x-coordinate(s) where $g(x)$ has an inflection point: ________________

4. (3 points each) For the function $w(x)$, one has $w''(x) = \dfrac{3(x-2)}{x^2+1}$. Find the following:

A. Interval(s) where $w(x)$ is concave up: ________________

B. Interval(s) where $w(x)$ is concave down: ________________

C. x-coordinate(s) where $w(x)$ has an inflection point: ________________



5. (9 points) Estimate the area below $y = h(x)$ and above the x-axis for $0 \le x \le 6$ by using $n = 3$ subintervals, taking the sampling points to be left endpoints. In the language of our textbook, this is L_3. Also, illustrate the rectangles on the graph above.

6. (6 points each) Find the following most general antiderivatives. I hope that you "C" what I mean.

A. $\displaystyle\int (7 + 2x + 3e^x)\; dx =$

B. $\displaystyle\int \big(\sec^2(\theta) + \cos(\theta)\big)\; d\theta =$

7. (12 points) The length of a rectangle is increasing at a rate of 2 ft/s, and its width is increasing at a rate of 5 ft/s. At what rate is the area of the rectangle increasing when the length is 4 ft and the width is 6 ft?

8. (10 points) Use a linearization for the function $f(x) = \sqrt{x}$ at $x = 4$ to approximate $\sqrt{4.04}$.

9. (10 points) Find the function $k(x)$ provided that $k'(x) = 2x^3 + 3x + 2$ and $k(0) = 2$.