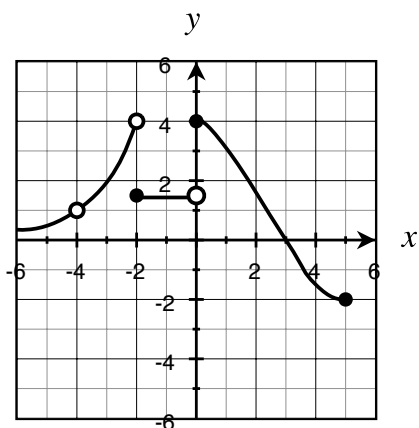


Name: _____

Math 105: Winter 2013
Exam 1: February 8

Correct answers accompanied by incorrect or incomplete work will not receive full credit.

1. (4 points each) The graph of $f(x)$ is given. Evaluate the following (assume the tickmarks occur at 1, 2, etc).



(a) $\lim_{x \rightarrow 0^-} f(x)$

(b) $\lim_{x \rightarrow 0^+} f(x)$

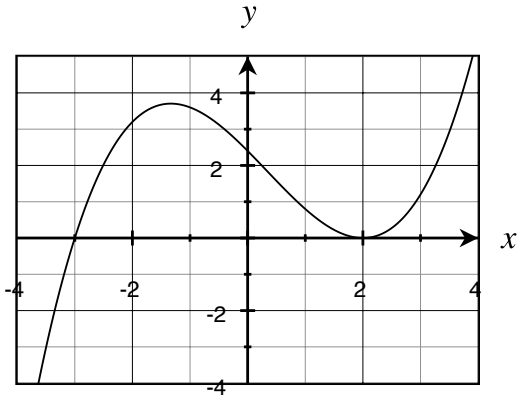
(c) $\lim_{x \rightarrow 0} f(x)$

(d) $f(0)$

(e) $\lim_{x \rightarrow -2} f(x)$

(f) $f(-2)$

2. (6 points) The graph below is a graph of $f(x)$. Estimate $f'(-3)$.

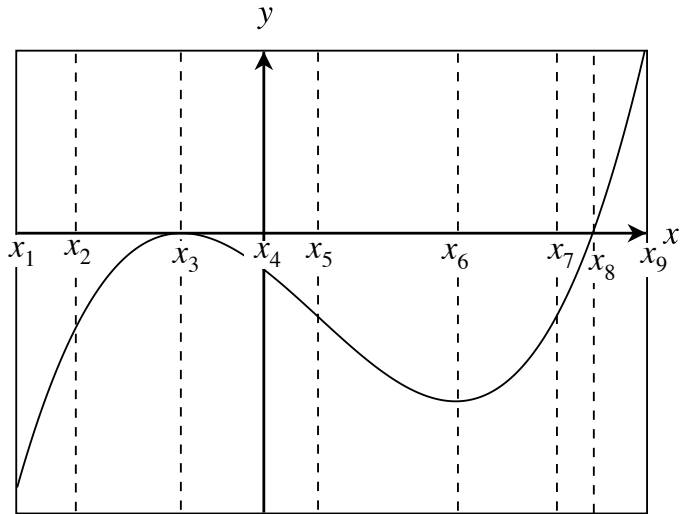


3. (6 points) Let $g(x) = \tan x$. Use secant line(s) to numerically estimate $g'(\pi/3)$. (Make sure your calculator is in RADIAN mode.)

4. (6 points) Let $h(x) = 3x^2 + \frac{6}{x^3} - 4\sqrt{x^3} + 7x^{-2} + 14$. Calculate $h'(4)$.

5. (4 points) Let $U(t)$ be the number of people unemployed in a country t months after the election of a new president. What does the statement $U'(20) = -10,000$ mean in this context? Include units in your answer.

6. (5 points each) The graph below is a graph of $f(x)$.



Let $F(x)$ be an antiderivative of $f(x)$.

(a) For what value(s) of x (if any) does F have a local maximum? Explain your answer.

(b) For what value(s) of x (if any) does F have a local minimum? Explain your answer.

(c) For what value(s) of x (if any) does F have an inflection point? Explain your answer.

7. (5 points each) Suppose $g'(w) = \sqrt{w} - 3$. JUSTIFY your answer to each of the following questions WITHOUT GRAPHING g' .

(a) What is the natural domain of $g'(w)$?

(b) Is -3 in the range of $g'(w)$?

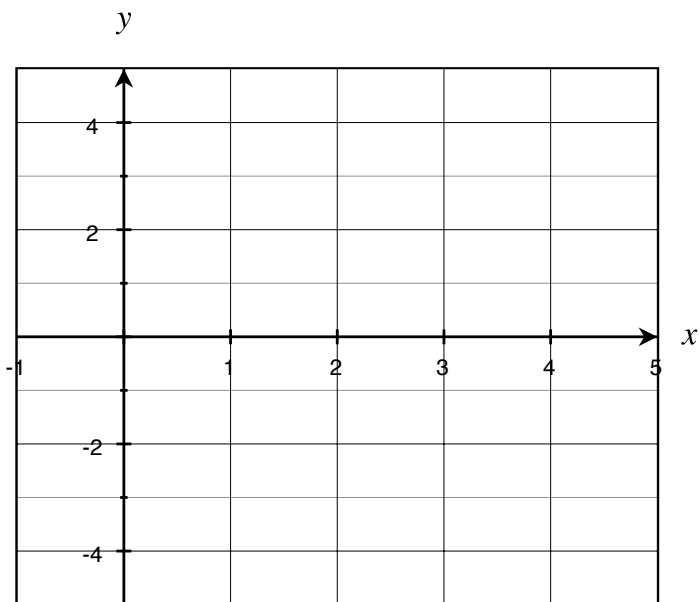
(c) Is g concave up at $w = 4$?

(d) g has a stationary point at $w = 9$. On g , is $w = 9$ a local maximum, local minimum, or neither?

8. (5 points) Let $h(x) = 3x^2 + \frac{6}{x^3} - 4\sqrt{x^3} + 7x^{-2} + 14$. Find an antiderivative of h .

9. (6 points) Sketch the graph of a *continuous* function $g(x)$ over the interval $[-1, 5]$ that has the following properties:

- $g(2) = 1$
- $g'(x) > 0$ on the interval $[-1, 3)$, $g'(3)$ does not exist, and $g'(x) > 0$ on the interval $(3, 5]$.
- $g''(x) < 0$ on the interval $[-1, 3)$, $g''(x) = 0$ on the interval $[3, 5]$.



10. (5 points) Let $f(x) = \frac{3}{x+2}$. Fill in all of the empty spaces in following equation.

$$f'(7) = \lim_{\square} \frac{f(\square) - f(\square)}{\square}$$

$$= \lim_{\square} \frac{(\square) - (\square)}{\square} \quad (f \text{ should NOT appear in this line})$$

11. (3 points) How many inches of snow do you think Lewiston will get this weekend?