Calculus I: Practice Midterm I

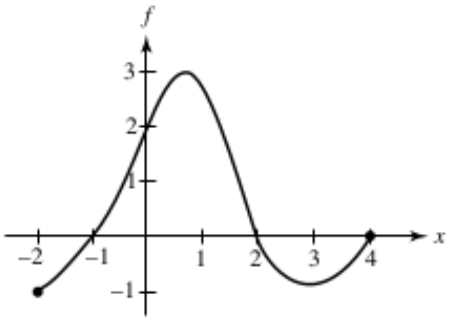
February 13, 2014

Name: _____

- Write your solutions in the space provided. Continue on the back for more space.
- Show your work unless asked otherwise.
- Partial credit will be given for incomplete work.
- The exam contains 6 problems.
- **Good luck!**

Question	Points	Score
1	7	
2	8	
3	10	
4	9	
5	8	
6	8	
Total:	50	

1. Below is the graph of a function f.



(a) (3 points) Use the graph to (approximately) compute the following:
(a) $f(-1)$, $f(0)$, and $f(1)$.

(b) All x such that $f(x) = 0$.

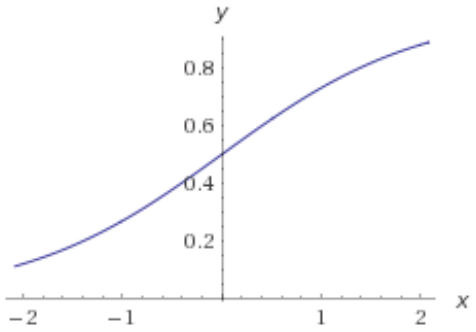
(c) The range of f.

(d) (4 points) Let $g(x) = x^2 + 1$. What is $f(g(1))$? What is $g(f(1))$?

2. (8 points) Let

$$f(x) = \frac{e^x}{1+e^x}.$$

The graph of $f(x)$ is shown below



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Does f have an inverse function? If yes, find a formula for $f^{-1}(y)$. If not, why not?

3. Calculate each of the following limits, if it exists. Justify your answer.

(a) (3 points) $\lim_{t \to 0^+} e^{-10/t}$

(b) (3 points) $\lim_{x \to 5} \dfrac{x + 10}{x - 5}$

(c) (4 points) $\lim_{x \to \infty} \dfrac{3x^2 + 10x - 1}{x^2 - 5}$

4. Let

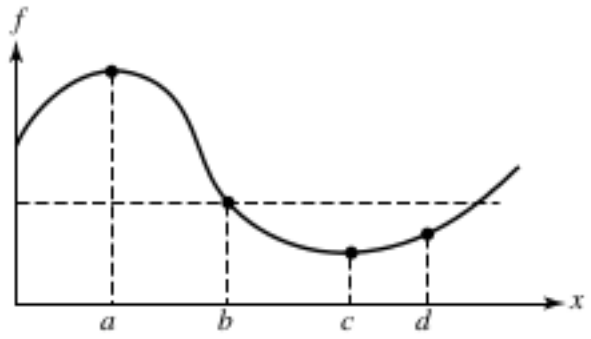
$$h(x) = \begin{cases} |x-1|-1 & \text{for } x < 2 \\ 0 & \text{for } x = 2 \\ x^2 - 4 & \text{for } x > 2. \end{cases}.$$

(a) (3 points) Compute $\lim_{x \to 2^+} h(x)$.

(b) (3 points) Compute $\lim_{x \to 2^-} h(x)$.

(c) (3 points) Is $h(x)$ continuous at 2?

5. (a) (4 points) Suppose $f(x)$ is given by the following graph



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Using the graph, put the following in ascending order

$$0, \quad f'(d), \quad \frac{f(c)-f(b)}{c-b}, \quad f'(b).$$

(b) (4 points) Suppose $g(x)$ is given by the formula

$$g(x) = 2x^3 - 3x + 4.$$

Compute $g(1)$ and $g'(1)$. Use this to find an approximate value of $g(1.1)$.

6. Let

$$f(x) = \frac{3x}{1+x}.$$

(a) (6 points) Use the definition of the derivative to find $f'(2)$.

(b) (2 points) Is f increasing or decreasing at $x = 2$?