MATH-19W: EXAM 1
UNIVERSITY OF VERMONT
FALL 2010

BLAKE FARMAN

Name: _____

Problem	Points Earned	Possible Points
1		4
2		4
3		4
4		4
5		4
Total		20

Date: October 8, 2010.

Show all work for full credit.

(1) Use the limit laws to compute

$$\lim_{x \to 0} \frac{\sqrt{x+2} - \sqrt{2}}{x}.$$

(2) Let f be the function defined by

$$f(x) = \frac{3x^3 + 2x - 1}{2x^4 - 3x^3 + 2}.$$

a Use the limit laws to compute $\lim_{x\to\infty} f(x)$.

b Does $f(x)$ have a horizontal asymptote? If so, where?

(3) Let f be the function defined by

$$f(x) = \begin{cases} x & \text{if } x \geq 0, \\ -x & \text{if } x < 0. \end{cases}$$

Use the definition of the derivative to find $f'(0)$.

(4) Let k be a constant and let f be the function defined by

$$f(x) = \begin{cases} k\log_2(x) & \text{if } x > 4, \\ 3x + 4 & \text{if } x \leq 4. \end{cases}$$

Find the value of k such that f is a continuous function.

(5) Let f be the function defined by

$$f(x) = \frac{1}{x+4}.$$

a Using the limit laws, find $\lim_{x \to -4} f(x)$.

b Does f have any discontinuities? If so, list each one and explain why it is a discontinuity.

c Does f have a vertical asymptote? If so, where?

d Use the definition of the derivative to compute $f'(x)$. For which values of x does the derivative exist?