TEST 1:

HW:

Extra Credit in class:

Maple Lab:

The Final Grade for TEST 1:

I. (10%) A function $y = f(x)$ is graphed below.

a) Estimate as well as you can:
$\lim_{x\to\ -2^-} f(x) =$
$\lim_{x\to\ -2^+} f(x) =$
$\lim_{x\to\ -2} f(x) =$

$\lim_{x\to 0^-} f(x) =$
$\lim_{x\to 0^+} f(x) =$

$\lim_{x\to 5^-} f(x) =$
$\lim_{x\to 5^+} f(x) =$

$\lim_{x\to 7} f(x) =$

b) At which points is the function graphed is discontinuous and why?

II. (10%) a) Find the limit:

$$\lim_{x \to 3} \frac{x^2 - 9}{x - 3}.$$

b) Explain, why the function

$$f(x) = \begin{cases} \frac{x^2-9}{x-3}, & x \neq 3, \\ 0, & x = 3, \end{cases}$$

is discontinuous at $x = 3$. Sketch the graph of the function.

III. (10%) Prove that the equation

$$\frac{x^5 + 6x - 1}{3x^4 + 14x^2 + 51} = \frac{1}{100}$$

has at least one solution in the interval [0,1].

IV. (10%) Let

$$f(x) = \frac{x^6 + 3x - 7}{4x^2 + 1 - 3x^6}.$$

a) Find the limit: $\lim_{x\to\infty} f(x)$.
b) Find the horizontal asymptotes of $f(x)$ both at $+\infty$ and $-\infty$.

V. (10%) Find the limit:

$$\lim_{x\to-\infty} \frac{x^5 + 6x - 1}{3x^4 + 14x^2 + 51}.$$

VI. (10%) Find the limit:

$$\lim_{x\to\infty} \frac{x^2+500}{x^3-99}.$$

VII. (10%) Let

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

Find:

a) $\lim_{x\to 3^-} f(x)$.

b) $\lim_{x\to 3^+} f(x)$.

c) A vertical asymptote of the function.

VIII. (10%) The curve below represents the graph of a function $f(x)$. Use the graph to estimate $f'(x)$ at the point $x = 23$. Explain your answer.

IX (10 %). Sketch the graph of a function $f(x)$, which satisfies the conditions: $f'(-2) = -1$, $f'(0) = 0$, $f'(2) = 1$.

X (10 %). The limit below represents the derivative of some function $f(x)$ at some number a. State f and a:

$$\lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4}.$$