Problem Set #1

Due: Wednesday, September 1

Due date of online homework: Orientation and diagnostic problems, Hw 1.1, HW 2.1, 08/29/10 HW 2.2 09/01/10

1. A piecewise defined function is given by

$$f(x) = \begin{cases} -3x - 1, & x < -1 \\ x^2 + 1, & -1 \leq x < 2 \\ x + 2, & 2 \leq x \end{cases}$$

(a) Find the graph of $y = f(x)$.

(b) Find the average rate of change of function over the interval $[-2, 2]$.

(c) Find the average rate of change of function over the interval $[1, \frac{3}{2}]$.

(d) Find an equation of the tangent line to the curve at $P(1, f(1))$. (Hint: Find the slope of the secant line through $(1, f(1))$ and $(1, f(1 + h))$ when h is very close to zero.)

(e) Find an equation of the tangent line to the curve at $P(-2, f(-2))$. (Hint: Find the slope of the secant line through $(-2, f(-2))$ and $(-2, f(-2 + h))$ when h is very close to zero.)

(f) Find an equation of the tangent line to the curve at $P(-2, f(-2))$. (Hint: Find the slope of the secant line through $(-2, f(-2))$ and $(-2, f(-2 + h))$ when h is very close to zero.)

(g) Determine if $\lim_{x \to -1} f(x)$ exists or not. Find the limit if it exists.

(h) Determine if $\lim_{x \to 2} f(x)$ exists or not. Find the limit if it exists.

(i) Determine if $\lim_{x \to 3} f(x)$ exists or not. Find the limit if it exists.

2. Evaluate the following limits if possible.

$(a) \lim_{x \to 1} \frac{\sqrt{x^2+3}-2}{x-1}$ $(b) \lim_{x \to 1} \frac{\frac{1}{x+1}-\frac{1}{2}}{x-1}$