Homework 1

Name:

P 1. Let

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

(a) Complete the table.

x	-3	-1.01	-1.001	-1	-0.999	-0.99	-0.9	$e-1$
$f(x)$								

(b) Graph f.

(c) Find

(i) $\lim\limits_{x \to -3^+} f(x)$

(ii) $\lim\limits_{x \to -3^-} f(x)$

(iii) $\lim\limits_{x \to -3} f(x)$

(iv) $\lim\limits_{x \to -2} f(x)$

(v) $f(100)$

(vi) $\lim\limits_{x \to -1} f(x)$

P 2. Let a be the negative solution to the equation

$$x^3 - 7x^2 + 7x + 15 = 0.$$

Find

$$\lim_{x \to a} \frac{|x - a|}{x - a}$$

[Hint: $f(x) = x^3 - 7x^2 + 7x + 15$ has a zero $x = 5$.]