Test I

9/16/02

Math 184H **Name**_____

Show all work to obtain full credit!

1. Evaluate.

   (a) $\lim_{x \to -1} \dfrac{x^2 - 1}{x + 1} =$

   (b) $\lim_{x \to 1} (4x^3 - 2x - 7) =$

   (c) $\lim_{x \to -\infty} \dfrac{2x^3 - 5x^2 + 7x - 9}{5x^3 - 6x + 11} =$

   (d) $\lim_{x \to 0} \dfrac{x}{\sqrt{x + 4} - 2} =$

   (e) $\lim_{x \to -2^+} \dfrac{|\, x^2 - 4 \,|}{x^2 + 3x + 2} =$

(f) $\lim_{x \to 2^+} 3\sqrt{2-x} =$

(g) $\lim_{x \to -\infty} \dfrac{3x^3 - 15x^2 - 9x}{5x^7 + x - 8} =$

(h) $\lim_{x \to 1^-} \dfrac{2}{x-1} =$

(i) $\lim_{x \to -1^-} \dfrac{|\, x+1 \,|}{x+1} =$

2. Sketch the graph of $y = f(x)$ and find $\lim_{x \to -2} f(x)$ where $f(x) = \begin{cases} 2x & \text{if } x \leq -2 \\ x^2 - 1 & \text{if } x \in (-2, 1] \\ 3x + 1 & \text{if } x \geq 1 \end{cases}$.

3. Use the Intremediate Value Theorem to verify that $f(x) = x^3 - 4x - 2$ has a zero in the interval $[-2, -1]$.

4. Find all discontinuities of $f(x) = \dfrac{\tan x}{x}$. For each discontinuity that is removable, define a new function that removes the discontinuity.

5. Use the definition of the limit to prove that the following limits exist.

   (a) $\lim\limits_{x \to 1}(x^2 - x + 1) = 1$

   (b) $\lim\limits_{x \to 1} \dfrac{x+2}{x^2} =$