Math 1496 Calc 1 - Homework #3

pg. 92, #75 and 76
pg. 81, #41, 42, and 40
Pg. 103-4, #5, 7, 9, 33, 51, 55 and 61
Pg. 112, #3, 11, 13, 37 and 39

pg. 92, #75 and 76
Find the limits of the following analytically

$$\#75 \quad \lim_{x\to 0} \frac{\sin 3x}{x} \qquad \#76 \quad \lim_{x\to 0} \frac{\sin 2x}{\sin 3x}$$

pg. 81, #41, 42, and 40
Use the $\delta - \epsilon$ definition to prove the following limits

$$\#41 \quad \lim_{x\to 2} 3x + 2$$

$$\#42 \quad \lim_{x\to 6} 6 - \frac{x}{3}$$

$$\#49 \quad \lim_{x\to -4} \frac{1}{2}x - 1$$

Pg. 103, #5, 7 and 9 (the graphs are in the book)
Determine the limit and discuss the continuity of each function

$$(a) \quad \lim_{x\to c^+} f(x) \qquad (b) \quad \lim_{x\to c^-} f(x) \qquad (c) \quad \lim_{x\to c} f(x)$$

#33 Discuss the continuity of the function (the graph are in the book)

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

Pg. 104, #51, 55 and 62
Find x values (if any) at which f is not continuous. Which ones are removable?

$$\#51 \quad f(x) = \begin{cases} \frac{1}{2}x + 1, & x \leq 2 \\ 3 - x, & x > 2 \end{cases}$$

$$\#55 \quad f(x) = \begin{cases} \ln(x+1), & x \geq 0 \\ 1 - x^2, & x < 0 \end{cases}$$

$$\#62 \quad f(x) = \begin{cases} 3x^2, & x \leq 1 \\ ax - 4, & x > 1 \end{cases} \quad (\text{find } a)$$

Pg. 112, # 3 From the graph (in the book) determine whether $f(x)$ approaches $-\infty$ or ∞ as x approaches 2

$$f(x) = 2\left|\frac{x}{x^2 - 4}\right|$$

11, 13 From the graph determine whether $f(x)$ approaches $-\infty$ or ∞ as x approaches -3

$$\#11 \quad f(x) = \frac{1}{x^2 - 9}$$

$$\#13 \quad f(x) = \frac{x^2}{x^2 - 9}$$

37, 39 Find the one-sided limit (if it exists)

$$\#37 \quad \lim_{x \to 2^+} \frac{x}{x - 2}$$

$$\#39 \quad \lim_{x \to -3^-} \frac{x + 3}{x^2 + x - 6}$$

Pg. 246, # 13, 25 and 29
Find the following limits (if it exists)

$$\#13 \quad \lim_{x \to \infty} \frac{x^2 + 2}{x^3 - 1}$$

$$\lim_{x \to \infty} \frac{x^2 + 2}{x^2 - 1}$$

$$\lim_{x \to \infty} \frac{x^2 + 2}{x - 1}$$

$$\#25 \quad \lim_{x \to -\infty} \frac{x}{\sqrt{x^2 - x}}$$

$$\#29 \quad \lim_{x \to \infty} \frac{\sqrt{x^2 - 1}}{2x - 1}$$