Name: _____

Problem Set 1
SHOW ALL WORK FOR CREDIT
You may submit solutions on a separate sheet of paper if you prefer.

Assigned: 9/8/06 Due: 9/15/06 (2 pts off for each day late)

1. a) Expand $(a + b)(c + d)(e + f)(g + h)$

b) Expand $(x + 1)^{11}$

c) Expand $(2x + 2)^{9}$

2. Pascal's triangle is partly based on the principle that one row of combinations generates another level of combinations when you add them. In other words, it is based on the principle that ${}_5C_2 + {}_5C_3 = {}_6C_3$, ${}_6C_4 + {}_6C_5 = {}_7C_5$, ${}_{10}C_4 + {}_{10}C_5 = {}_{11}C_5$, etc.

a) Generalize this addition of combinations rule using variables to represent the numbers. Hint: you should only need two variables.

b) Prove that this rule works (no matter what numbers are substituted for the variables), by using the formula for "choose". Hint: ${}_nC_r = \frac{n!}{r!\,(n-r)!}$

3. Explain what is wrong with the following solution. (If you propose an alternate solution, explain why yours is necessary.)

$$x^2 + x = 0$$
$$-x \quad -x$$

$$x^2 = -x$$

$$\frac{x^2}{x} = \frac{-x}{x}$$

$$x = -1$$

4. Find the limits of the following functions. Justify your answer completely.

a) $\lim_{x \to 0} \frac{3x}{x^3}$

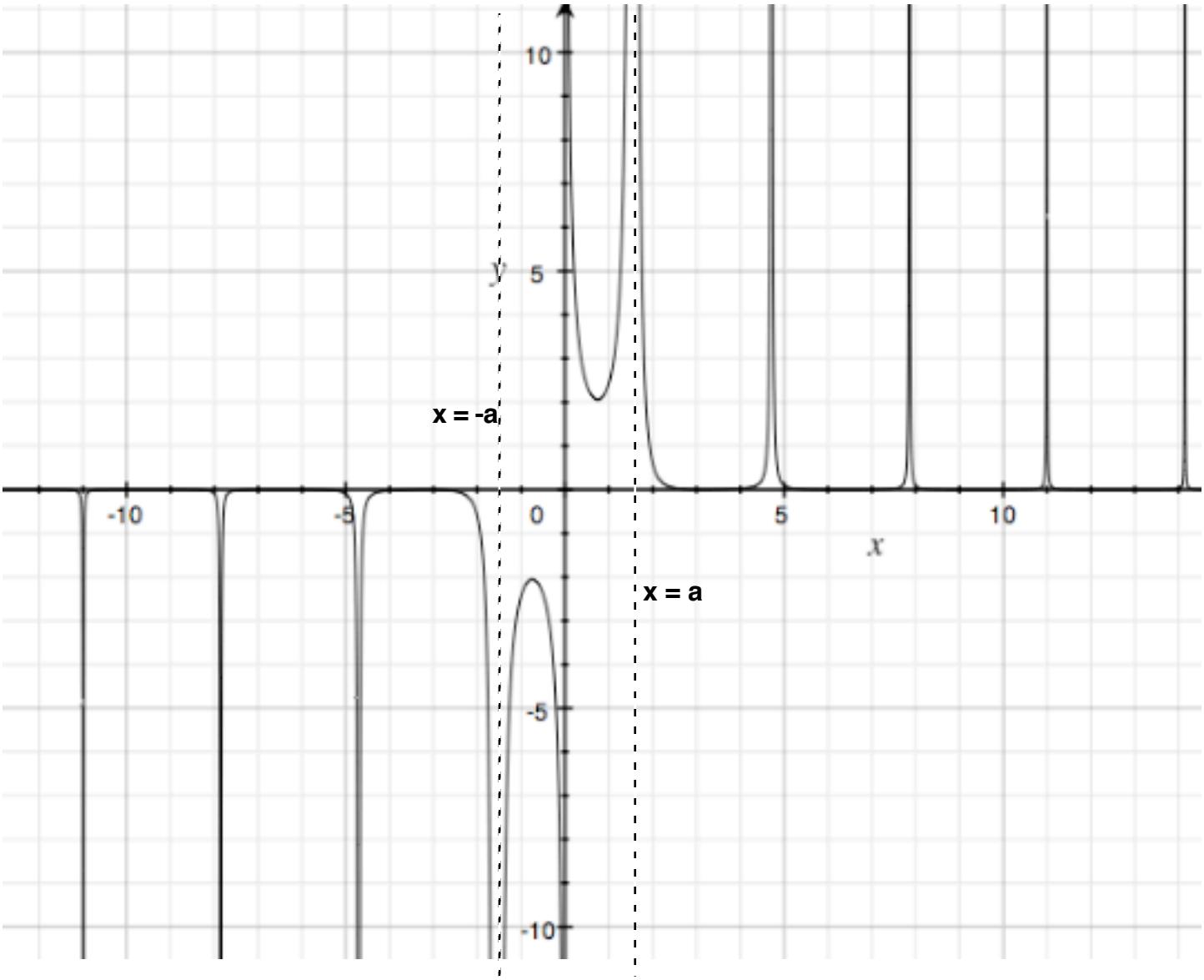
b) $\lim_{x \to \infty} \frac{3x}{x^3}$

c) $\lim_{x \to 3} \frac{x^2 + 6x - 7}{x - 1}$

d) $\lim_{x \to 1} \frac{x^2 + 6x - 7}{x - 1}$

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

5. Find the limits of the function requested using the graph of f(x) below, which has asymptotes at **x = a** and **x = -a.**



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

b) $\lim_{x \to a} f(x)$

c) $\lim_{x \to 0+} f(x)$

d) $\lim_{x \to 0-} f(x)$

e) $\lim_{x \to 0} f(x)$

f) $\lim_{x \to \infty} f(x)$ Hint: this function involves a trigonometric function.

g) Explain your answer to (f) in words.