PLEASE, BE NEAT AND SHOW ALL YOUR WORK; CIRCLE YOUR ANSWER.

Problem Number	Possible Points	Points Earned
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
TOTAL	100	

1. Find the domain of the function
$$f(x) = \frac{\sqrt[3]{x+1}}{x^2 - 16}.$$

pts: /10

2. Find an equation for the line which intercepts the x-axis at $x = 2$ and has slope $-\frac{1}{3}$.

pts: /10

3. Evaluate the following limits

(a) $\lim_{x \to 3} \dfrac{x+1}{x+3} =$ _____ .

(b) $\lim_{x \to 1} \dfrac{x^2-1}{(x-1)^2} =$ _____ .

pts: /10

4. In 1984, the rate for interstate telegrams was \$8.45 for 10 words or less plus 45 cents for each additional word. Express the cost, C, of sending a telegram as a function of its length, x.

   – A: $C = C(x) = 845x + 45$;

   – B: $C = C(x) = 845 + 45x$;

   – C: $C = C(x) = \begin{cases} 845x & \text{if } 0 \le x \le 10 \\ 845x + 45 & \text{if } x > 10 \end{cases}$;

   – D: $C = C(x) = \begin{cases} 845 & \text{if } 0 \le x \le 10 \\ 845 + 45x & \text{if } x > 10 \end{cases}$;

   – E: $C = C(x) = \begin{cases} 845 & \text{if } 0 \le x \le 10 \\ 845 + 45(x - 10) & \text{if } x > 10 \end{cases}$.

pts: /10

5. Which of the following could be the graph of

$$y = \frac{1}{(x-1)(x+1)}?$$

6. If $f(x) = \dfrac{x-1}{x+1}$ find $f(f(x)) = $ _____. Simplify your answer as much as possible.

7. Find the value of the constant A such that the function $f(x)$ will be continuous for all x

$$f(x) = \begin{cases} 2x^2 - 3x + 4 & \text{if } x \le 7 \\ Ax + 18 & \text{if } x > 7. \end{cases}$$

8. Use the graph to fill in the blanks for (a) - (d) as completely as possible.

(a) $f(x)$ is not defined at $x = $ ⎯⎯⎯⎯⎯⎯ only.

(b) $\lim\limits_{x \to -1} f(x) = $ ⎯⎯⎯⎯⎯⎯ .

(c) $\lim\limits_{x \to 3} f(x) = $ ⎯⎯⎯⎯⎯⎯ .

(d) $f(x)$ is discontinuous at $x = $ ⎯⎯⎯⎯⎯⎯ only.

pts: /10

9. Suppose that at price y yen per dollar the demand for dollars on the foreign exchange market is $D(y) = \dfrac{120}{y}$ billion dollars and the supply is $S(y) = \dfrac{y}{100}$ billion dollars. Find

(a) the equilibrium price (y) for dollars;

(b) the number of dollars exchanged at this price.

pts: /10

10. A retailer can get sweatshirts from the manufacturer for $15 apiece. The retailer has been selling then for $20 apiece, and at this price customers have been buying 100 sweatshirts per month. The retailer estimates that for each $1 increase in price 5 fewer shirts will be sold per month.

   (*a*) Express the number of shirts sold per month as a function of the selling price.

   (*b*) Express the monthly profit as a function of the <u>selling price</u>.