Test A Chapter 2 Name________________________________

Determine the limit algebraically, if it exists.

1) $\lim\limits_{x \to 4} \dfrac{x^2 + 4x - 32}{x^2 - 16}$

2) $\lim\limits_{x \to 0} \dfrac{\dfrac{1}{x+6} - \dfrac{1}{6}}{x}$

3) $\lim\limits_{x \to 4^-} \dfrac{|x-4|}{x-4}$

Find the indicated limit.

4) a) $\lim\limits_{x \to 0^+} \frac{7x}{|x|}$

b) $\lim\limits_{x \to 0^-} \frac{7x}{|x|}$

c) $\lim\limits_{x \to 0} \frac{7x}{|x|}$

Evaluate or determine that the limit does not exist for each of the limits for the given function f.

5)

$$f(x) = \begin{cases} -2x - 2, & \text{for } x < 1, \\ 1, & \text{for } x = 1, \\ -4x + 8, & \text{for } x > 1 \end{cases}$$

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

(b) $\lim\limits_{x \to 1^+} f(x)$

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

Find the limits of f(x)

6) $f(x) = \begin{cases} \dfrac{x - 4}{x - 2}, & x \le 0 \\ \dfrac{1}{x^2}, & x > 0 \end{cases}$

(a) $\lim\limits_{x \to \infty} f(x)$

(b) $\lim\limits_{x \to -\infty} f(x)$

(c) $\lim\limits_{x \to 0^-} f(x)$

(d) $\lim\limits_{x \to 0^+} f(x)$

Find the points of discontinuity. Identify each type of discontinuity. Use limits to defend your choice.

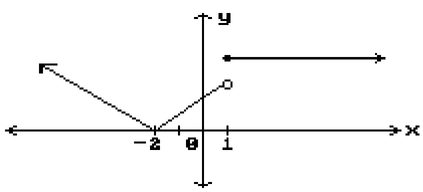
7) $y = \dfrac{x + 4}{x^2 - 14x + 48}$

For problems 8 and 9 find all points where the function is discontinuous. Then identify any x-values where the function is not differentiable. Be specific which points are discontinuous and/or which are not differentiable.

8)

$$f(x) = \begin{cases} \dfrac{x^2 - 16}{x + 4}, & x \neq -4 \\ 10, & x = -4 \end{cases}$$

9)



Find a value for a so that the function f(x) is continuous.

10) $f(x) = \begin{cases} x^2 - 5, & x < 4 \\ 5ax, & x \geq 4 \end{cases}$

11) Sketch a graph of a function that satisfies the given conditions.

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

12) Sketch a graph of a function that satisfies the given conditions.

$\lim_{x\to 5} f(x)$ does not exist and $\lim_{x\to 5^+} f(x) = f(5) = 2$

Use a definition of the derivative to set up the limit you would use to find the slope at the given point. Then, using the substitution h = x - a, set up the limit in terms of h,that would find the derivative of f(x) at x = 4.

13) $f(x) = \dfrac{4}{x + 3}$ at $x = 4$

Use a definition of the derivative to set up the limit you would use to find the slope at the given point. Then, using the substitution h = x - a, set up the limit, in terms of h, that would find the derivative of f(x) at x = -3. After you have set up the limit, for extra credit find the actual slope at the point (-3, -54) by evaluating a definition of the derivative.

14) $f(x) = 3x - 5x^2$ at the point (-3, -54).

15)

t (minutes)	0	2	5	8	12
$v_A(t)$ (meters/min)	0	100	40	-120	-150

4. Train A runs back and forth on an east-west section of railroad track. Train A's velocity, measurec per minute, is given by a differentiable function $v_A(t)$, where time t is measured in minutes. Select values for $v_A(t)$ are given in the table above.

b) Do the data in the table support the conclusion that train A's velocity is 50 meters per minu some time t with $0 < t < 2$? Give a reason for your answer.