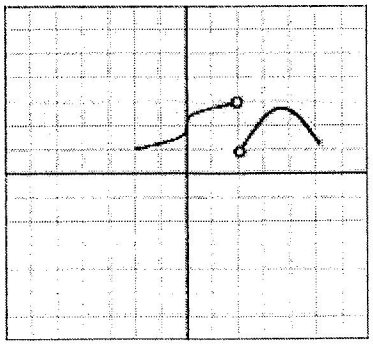
PART 1: Use a graph to evaluate each limit, if it exists:

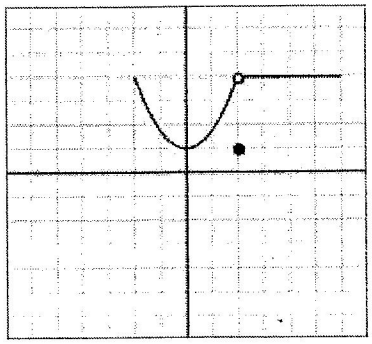
a. $\lim_{x\to 2^-} f(x)$ **b.** $\lim_{x\to 2^+} f(x)$ **c.** $\lim_{x\to 2} f(x)$ **d.** $\lim_{x\to 0^-} f(x)$ **e.** $\lim_{x\to 0^+} f(x)$ **f.** $\lim_{x\to 0} f(x)$

1.



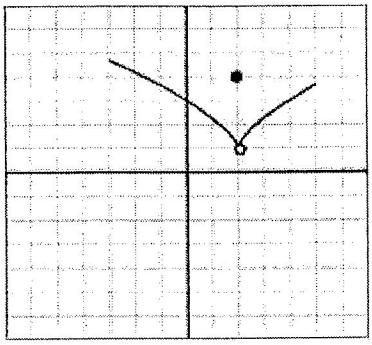
a. 3 b. 1 c. DNE
d. 2 e. 2 f. 2

2.



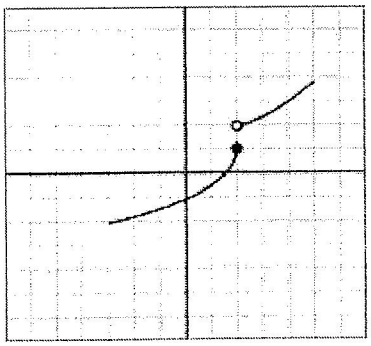
a. 4 b. 4 c. 4
d. 1 e. 1 f. 1

3.



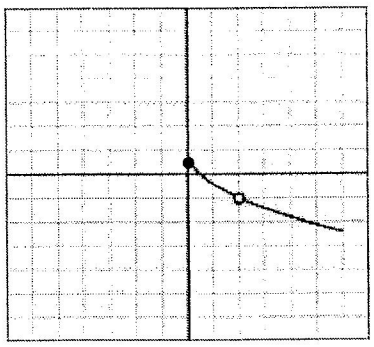
a. 1 b. 1 c. 1
d. 3 e. 3 f. 3

4.



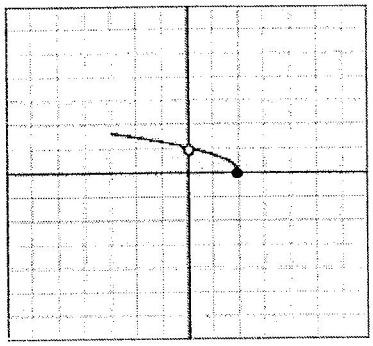
a. 1 b. 2 c. DNE
d. -1 e. -1 f. -1

5.



a. -1 b. -1 c. -1
d. DNE e. 1/2 f. DNE

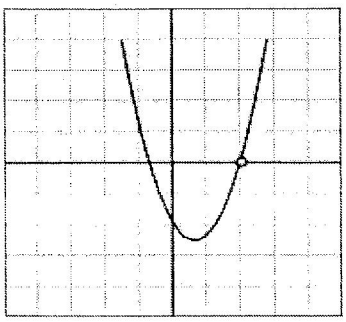
6.



a. 0 b. DNE c. DNE
d. 1 e. 1 f. 1

6

7.

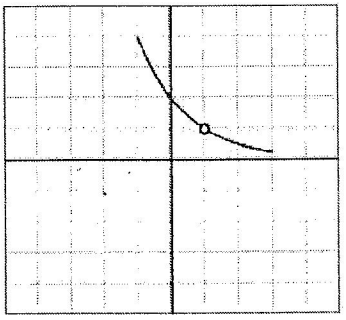


a. $\lim_{x\to 2} f(x) =$ 0

b. $\lim_{x\to 0} f(x) =$ -2

c. $f(2) =$ DNE

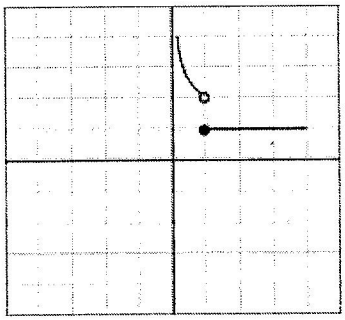
8.



a. $\lim_{x\to 1} f(x) =$ 1

b. $\lim_{x\to 0} f(x) =$ 2

9.



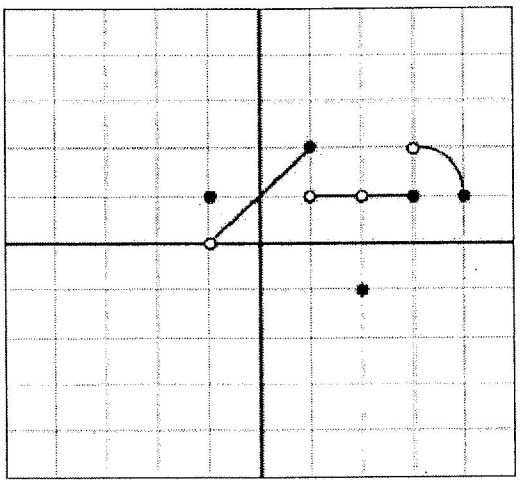
a. $\lim_{x\to 1^-} f(x) =$ 2

b. $\lim_{x\to 1^+} f(x) =$ 1

c. $\lim_{x\to 1} f(x) =$ DNE

d. $f(1) =$ 1

10.



True or false?

F a. $\lim_{x\to 2} f(x) = -1$

F b. $\lim_{x\to -1^+} f(x) = 1$

T c. $\lim_{x\to 1^+} f(x) = 1$

T d. $\lim_{x\to 2} f(x)$ exists

F e. $\lim_{x\to 3} f(x) = 1$

T f. $\lim_{x\to 1} f(x)$ DNE

T g. $\lim_{x\to 3^-} f(x) = 1$

T h. $\lim_{x\to 0^+} f(x) = \lim_{x\to 0^-} f(x)$

T i. $\lim_{x\to 0} f(x)$ exists

T j. $\lim_{x\to 2} f(x) = 1$

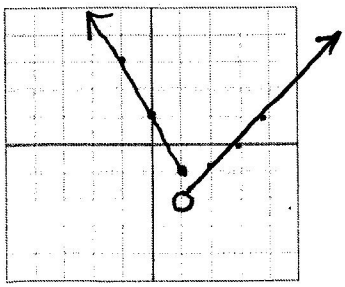
T k. $\lim_{x\to c} f(x)$ exists at every c on the interval (-1,1)

T l. $\lim_{x\to c} f(x)$ exists at every c on the interval (1,3)

PART 2: Graph and find the limit.

1. $\lim_{x\to 1} f(x)$, $f(x) = \begin{cases} 1-2x, & x \le 1 \\ x-3, & x > 1 \end{cases}$

DNE



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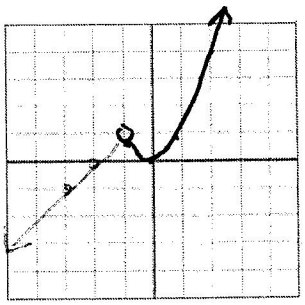
2. $\lim_{x \to -1} f(x)$, $f(x) = \begin{cases} x+2, & x < -1 \\ x^2, & x > -1 \end{cases}$

1



PART 3: Evaluate each limit.

1. $\lim_{x \to 0^-} \frac{1}{x}$ DNE $-\infty$

2. $\lim_{x \to 0^+} \frac{1}{x}$ DNE ∞

3. $\lim_{x \to 0} \frac{1}{x}$ DNE

4. $\lim_{x \to 0} \frac{1}{x^2}$ DNE, ∞

5. $\lim_{x \to 2^+} \frac{x+1}{x+2}$ $\frac{3}{4}$

6. $\lim_{x \to 5^+} \frac{x^2-25}{x-5}$ 10

7. $\lim_{x \to 6^+} \frac{x+6}{x^2-36}$ DNE ∞

8. $\lim_{x \to 6} \frac{x+6}{x^2-36}$ DNE

9. $\lim_{x \to 0^+} (5x-1)$ -1

10. $\lim_{x \to 2} \frac{x^2-4x+4}{x^2+x-6}$ 0

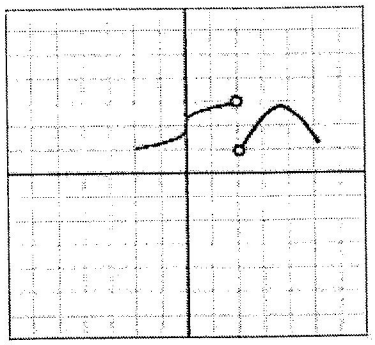
11. $\lim_{x \to 4^+} \frac{3}{x-4}$ DNE ∞

12. $\lim_{x \to 4^-} \frac{3}{x-4}$ DNE $-\infty$

Refer to the graph to find each of the following:

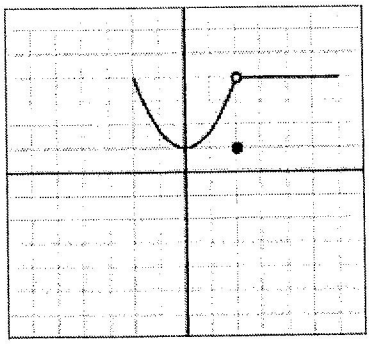
a) the value(s) of x for which the function is discontinuous
b) why it is discontinuous at that value
c) the type of discontinuity
d) whether it is removable (R) or nonremovable (NR) discontinuity

1)



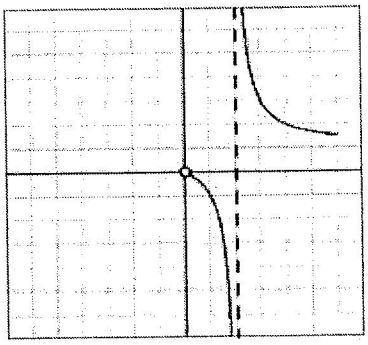
a) $x = 2$
b) $\lim_{x \to 2^-} f(x) = 3$ $\lim_{x \to 2^+} f(x) = 1$
c) jump
d) NR

2)



a) $x = 2$
b) cont. everywhere except $x=2$
c) hole
d) R

3)



a) $x = 2$
b) $\lim_{x \to 2^-} f(x) = -\infty$ $\lim_{x \to 2^+} f(x)$
c) Infinite
d) NR