

"Have you entered into the  
 Verse: Spring of sea, or walked in the  
 recesses of the deep?" — Job 28:16

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 Period: 3  
 Date: 5/13

Pre-Calc Practice Test #12  
 (Rational Functions, Limits)

\*Show your work\*

\*No calculator

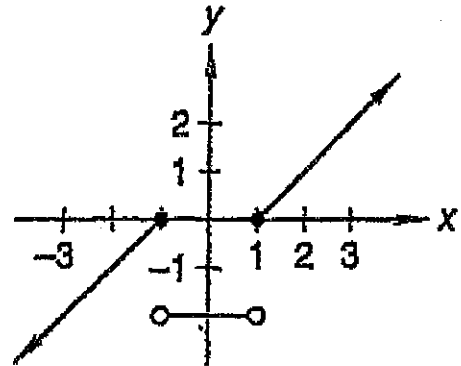
1. Using the graph  $f(x)$ , find:

a)  $\lim_{x \rightarrow 0} f(x)$

b)  $\lim_{x \rightarrow -1} f(x)$  DNE

$\lim_{x \rightarrow 1} = -2$

$\lim_{x \rightarrow -1} = 0$

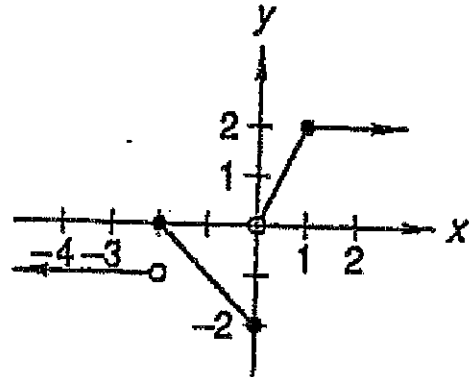


2. Using the graph  $g(x)$ , find:

a)  $\lim_{x \rightarrow -2^-} g(x) = -1$

b)  $\lim_{x \rightarrow 1} g(x) = 2$

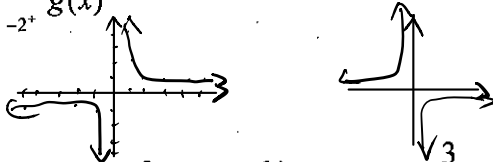
c)  $\lim_{x \rightarrow -2^+} g(x) = 0$



3. Graph

a)  $xy = 3$   
 $y = \frac{3}{x}$

b)  $y = -\frac{3}{x}$



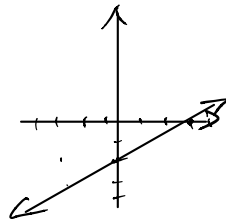
4. Graph:

$y = \frac{x^2 - 2x - 3}{5x + 5}$

$x = -1$

$y = -\frac{4}{5}$

$\frac{x-3}{5}$



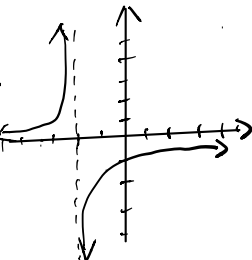
5. Graph:

$y = \frac{-2x - 6}{x^2 + 5x + 6}$

$(x+3)(x+2)$

$x = -3$   $y = 2$

$x = -2$



6. Given  $f(x) = \frac{x^2 - x^4 - 2}{x^3 - 2x^2 - 8x}$

a)  $\lim_{x \rightarrow \infty} f(x)$   
 DNE

b)  $\lim_{x \rightarrow -1} f(x) = \frac{1-1-2}{-1-2+8} = \frac{-2}{5}$

7. Graph:

a)  $y = \frac{(x-1)(x-2)(x-3)}{(x-1)(x+1)(x+2)(x-5)}$

$y = -\frac{1}{12}$   $x = 1$   $0 < x < 2 < 3$   
 MA:  $y = 0$

b)  $y = \frac{x^2 + 8x + 15}{x^2 + 3x - 10}$   $\text{hor } x = -5$   $y = \frac{2}{7}$

$\frac{(x+5)(x+3)}{(x+5)(x-2)}$   
 $x = -3$   
 VA:  $x = 2$

c)  $y = \frac{(x+3)(x+1)}{(x-1)(x+2)}$   $\text{HA } y = 1$   
 $x = -3, -1$

$x = -1$   $\Rightarrow$   $\text{HA } y = 1$

8. Given  $f(x) = \frac{-2x - 2x^2 + 4}{3x^2 + 6x - 9}$

a)  $\lim_{x \rightarrow \infty} f(x) = \frac{-2}{3}$

b)  $\lim_{x \rightarrow 1} f(x) = \frac{1}{2}$

c)  $\lim_{x \rightarrow -3} f(x) = \text{DNE}$

9. Graph:

a)  $y = \frac{(x+2)(x-3)(x-2)}{(x-2)(x-1)(x+3)(x-5)}$

$x = -2; 3$   $\text{VA} = x = 1, 3, 5$

$\text{hor } x = 2, y = \frac{4}{15}$   $y = 0$

b)  $y = \frac{x^2 + x - 6}{x^2 + 5x + 6}$

$\frac{(x+3)(x-2)}{(x+3)(x+2)}$

$\text{hor } x = 3$   $y = \frac{-2}{-1} = 2$

VA:  $x = -2$

HA:  $y = 1$

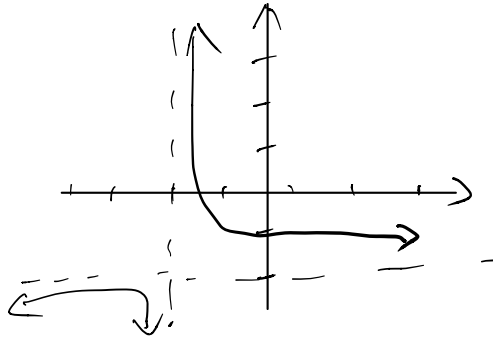
Graph the function.

$$10) f(x) = \frac{-2x - 3}{x + 2}$$

$$-2x - 3 = 0$$

$$x = -\frac{3}{2}$$

$$x = -2$$



MULTIPLE CHOICE.

Find the asymptote(s) of the given function.

$$11) h(x) = \frac{(x - 3)(x + 3)}{x^2 - 1} \text{ vertical asymptotes(s)}$$

A)  $x = 1, x = -1$

B) None

C)  $x = -3, x = 3$

D)  $x = 3, x = -3$

11) A

For the given function, find all asymptotes of the type indicated (if there are any)

$$12) f(x) = \frac{8x^2 - 2x - 2}{3x^2 - 7x + 6}, \text{ horizontal}$$

A)  $y = 8/3$

B)  $y = 2/7$

C)  $y = 0$

D) None

12) A

Use limits to describe the behavior of the rational function near the indicated asymptote.

$$13) f(x) = -\frac{8}{x + 2}$$

Describe the behavior of the function near its vertical asymptote.

A)  $\lim_{x \rightarrow 2^-} f(x) = \infty, \lim_{x \rightarrow 2^+} f(x) = -\infty$

B)  $\lim_{x \rightarrow -2^-} f(x) = \infty, \lim_{x \rightarrow -2^+} f(x) = \infty$

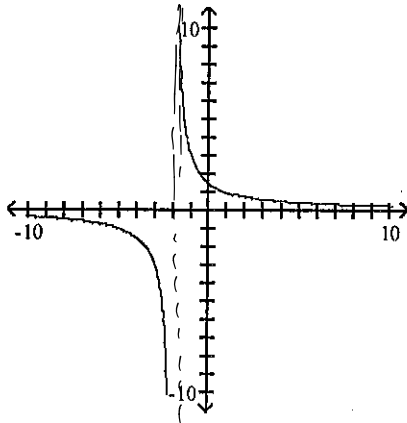
C)  $\lim_{x \rightarrow -2^-} f(x) = \infty, \lim_{x \rightarrow -2^+} f(x) = -\infty$

D)  $\lim_{x \rightarrow -2^-} f(x) = 0, \lim_{x \rightarrow -2^+} f(x) = 0$

13) C

Evaluate the limit based on the graph of  $f$  shown.

14)



$$\lim_{x \rightarrow \infty} f(x)$$

A) 0

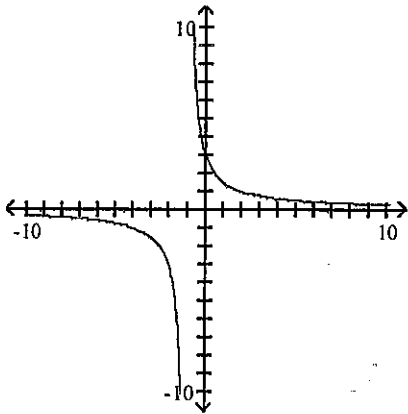
B) 2

C)  $\infty$

D)  $-\infty$

14) A

15)



$$\lim_{x \rightarrow -1^-} f(x)$$

A)  $-\infty$

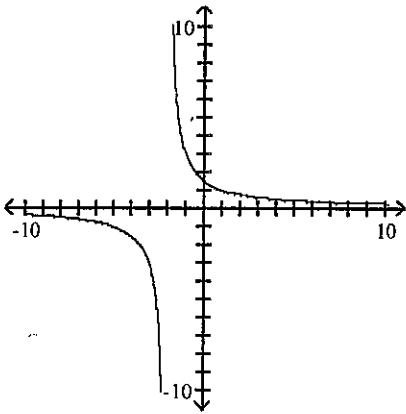
B) 0

C) 1

D)  $\infty$

15) A

16)



$$\lim_{x \rightarrow -2^+} f(x)$$

A) -2

B)  $-\infty$

C)  $\infty$

D) 0

16) C

Find the asymptote(s) of the given function.

17)  $g(x) = \frac{x^2 + 8x - 9}{x - 9}$  horizontal asymptote(s)

A)  $y = -8$   $(x-1)(x+9)$  B) None

C)  $y = 9$

D)  $y = 3$

17) B

Find the limit of the function

18)  $\lim_{x \rightarrow -3} \frac{x^2 - 2x - 15}{x + 3}$   $(x-5)(x+3)$

A) 5

B) 0

C) Does not exist

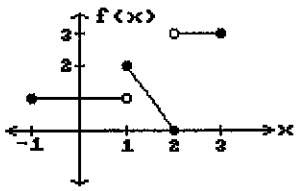
D) -8

18) D

Use the given graph to determine the limit, if it exists.

19)  $\lim_{x \rightarrow 1} f(x)$

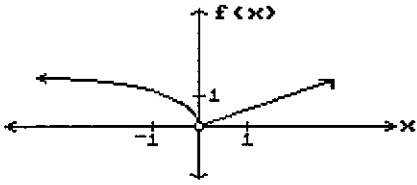
19) D



- A) 2                      B) 1                      C) 0                      D) Does not exist

20)  $\lim_{x \rightarrow 0} f(x)$

20) D

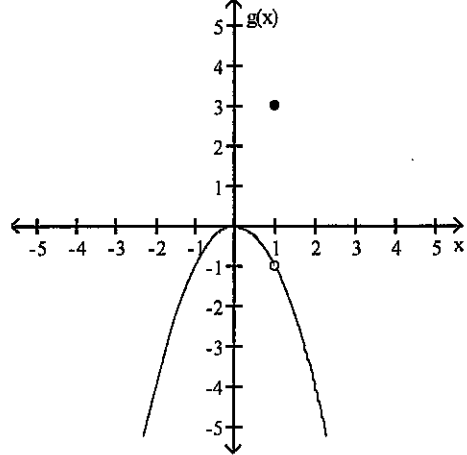


- A) -1                      B) Does not exist                      C) 1                      D) 0

21)  $\lim_{x \rightarrow 1} g(x)$

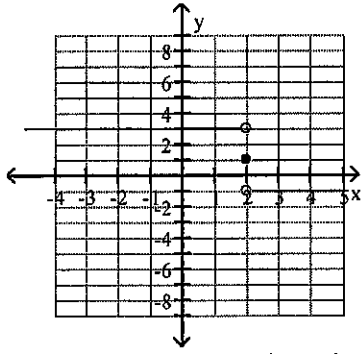
21) D

$$g(x) = \begin{cases} -x^2 & \text{for } x \neq 1 \\ 3 & \text{for } x = 1 \end{cases}$$



- A) Does not exist                      B) 3                      C) 2                      D) -1

22)



Find  $\lim_{x \rightarrow 2^-} f(x)$  and  $\lim_{x \rightarrow 2^+} f(x)$ .

$f(2) = 1$   
 $\lim_{x \rightarrow 2^-} f(x) = 3$   
 $\lim_{x \rightarrow 2^+} f(x) = 1$   
 DNE  $\lim_{x \rightarrow 0^+} = 10$

Find the indicated limit, if it exists.

23)  $\lim_{x \rightarrow 0} f(x), f(x) = \begin{cases} -2x - 10 & x < 0 \\ |10 - x| & x \geq 0 \end{cases}$

$\lim_{x \rightarrow 0} = 10$

24)  $\lim_{x \rightarrow 0} f(x), f(x) = \begin{cases} 8 - x^2 & x < 0 \\ 8 & x = 0 \\ 2x + 8 & x > 0 \end{cases}$

$\lim_{x \rightarrow 8^-} = 8$   
 $\lim_{x \rightarrow 8^+} = 8$