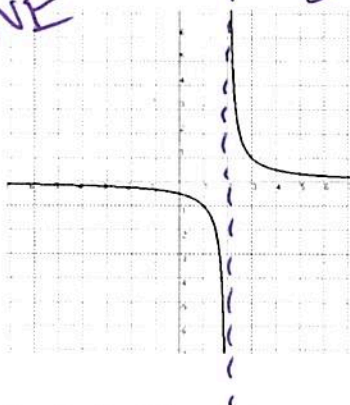


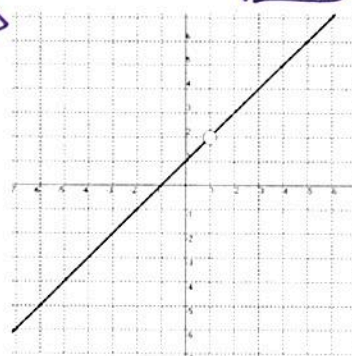
## Piecewise and Limits Test Review

Use the graphs to find the limits if they exist. If not, write DNE.

1.  $\lim_{x \rightarrow 2} \frac{1}{x-2} = \lim_{x \rightarrow -1} \frac{1}{x-2} = -\frac{1}{3}$   
 DNE



2.  $\lim_{x \rightarrow 1} \frac{x^2-1}{x-1} = 2$        $\lim_{x \rightarrow -5} \frac{x^2-1}{x-1} = -4$        $\lim_{x \rightarrow 0} \frac{x^2-1}{x-1} = 1$



Find the limit, if it exists.

3.  $\lim_{x \rightarrow 1} \left( \frac{1}{2}x + 3 \right) = 5$

4.  $\lim_{x \rightarrow 3} \frac{|x-3|}{x-3} = \text{DNE}$

5.  $\lim_{x \rightarrow -1} \frac{\frac{1}{x+2} - 1}{\frac{x+2}{x+2}} = \frac{1-x-2}{x+2} \cdot \frac{1}{x+1} = \frac{-1-x}{x+2} \cdot \frac{1}{x+1} = \frac{-1(4)}{x+2} \cdot \frac{1}{x+1} = \frac{-1}{x+2}$

6.  $\lim_{x \rightarrow -3} (x^3 - 6x^2 + 3x - 1) = (-3)^3 - 6(-3)^2 + 3(-3) - 1 = -91$

7.  $\lim_{x \rightarrow 5} \frac{x-5}{x^2+5x-50} = \frac{x-5}{(x-5)(x+10)} = \frac{1}{x+10} = \frac{1}{15}$

8.  $\lim_{x \rightarrow 0} \frac{(\sqrt{x+4}-2)\sqrt{x+4+2}}{x} = \frac{x+4-4}{x\sqrt{x+4}+2} = \frac{1}{\sqrt{4}+2} = \frac{1}{4}$

9.  $\lim_{x \rightarrow 2} \frac{4x}{2x-3} = 2$

10.  $\lim_{x \rightarrow 2} f(x)$  where  $f(x) = \begin{cases} 5-x, & x \leq 2 \\ x^2-3, & x > 2 \end{cases}$   
 DNE

11.  $\lim_{x \rightarrow \infty} \frac{x^2}{2x+3} = \infty$

12.  $\lim_{x \rightarrow 2} \frac{x^3-2x^2-x+14}{x+2}$   

$$\begin{array}{r} -2 \phantom{0} \\ 1 \phantom{0} - 2 \phantom{0} - 1 \phantom{0} 14 \\ \underline{\phantom{0} - 2 \phantom{0} 8 \phantom{0} - 14} \\ 1 \phantom{0} - 4 \phantom{0} 7 \phantom{0} 0 \end{array}$$

$$x^2 - 4x + 7 = 19$$

13.  $\lim_{x \rightarrow \frac{3\pi}{4}} \csc x = \frac{2}{\sqrt{2}}$

14.  $\lim_{x \rightarrow \frac{\pi}{2}} \tan x = \text{DNE}$

15.  $\lim_{x \rightarrow -\infty} \sin x = \text{DNE}$

16.  $\lim_{x \rightarrow -\infty} \frac{x^2+3}{5x^2-4} = \frac{1}{5}$

17.  $\lim_{x \rightarrow \infty} \sqrt{\frac{4x^2-3x+2}{5x^2-6}} = \frac{\sqrt{4}}{\sqrt{5}} = \frac{\sqrt{4}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{20}}{5} = \frac{2\sqrt{5}}{5}$

18.  $\lim_{x \rightarrow \infty} \frac{-x^2}{2x^3+3} = 0$

$$19. \lim_{x \rightarrow 5} \frac{x^3 - 125}{x - 5}$$

$$\frac{(x-5)(x^2 + 5x + 25)}{x-5}$$

$$x=5$$

$$\boxed{75}$$

$$20. \lim_{x \rightarrow \infty} \left[ \frac{x}{2x+1} + \frac{3x^2}{(x-3)^2} \right]$$

$$\frac{1}{2} + 3$$

$$= \boxed{3.5 \text{ or } \frac{7}{2}}$$

$$21. \lim_{x \rightarrow 16} \frac{\sqrt{x}-4}{x-16} \cdot \frac{(\sqrt{x}+4)}{(\sqrt{x}+4)}$$

$$\lim_{x \rightarrow \infty} \sqrt{\frac{x+4}{x^2-6x+3}} = \boxed{0}$$

$$\frac{x=16}{(x-16)(\sqrt{x}+4)}$$

$$\frac{1}{\sqrt{x}+4} = \boxed{\frac{1}{8}}$$

Evaluate the function for the given value of x.

$$f(x) = \begin{cases} 3, & \text{if } x \leq 0 \\ 2, & \text{if } x > 0 \end{cases}$$

$$g(x) = \begin{cases} x+5, & \text{if } x \leq 3 \\ 2x-1, & \text{if } x > 3 \end{cases}$$

$$h(x) = \begin{cases} \frac{1}{2}x - 4, & \text{if } x \leq -2 \\ 3 - 2x, & \text{if } x > -2 \end{cases}$$

23.  $f(0)$

$$\boxed{3}$$

24.  $f(\frac{1}{2})$

$$\boxed{2}$$

25.  $g(-1)$

$$\boxed{4}$$

26.  $g(3)$

$$\boxed{8}$$

27.  $h(-2)$

$$\boxed{-5}$$

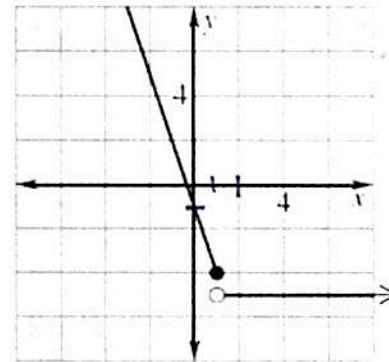
28.  $h(6)$

$$\boxed{-9}$$

29. Write a piecewise function for the following graph.

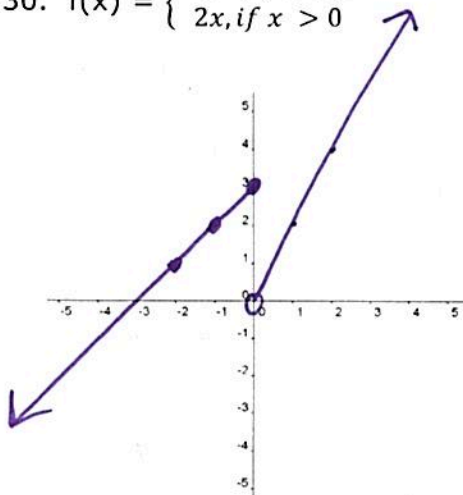
(notice increments on the axis)

$$f(x) = \begin{cases} -3x - 1, & x \leq 1 \\ -5, & x > 1 \end{cases}$$



Graph the following.

$$30. f(x) = \begin{cases} x+3, & \text{if } x \leq 0 \\ 2x, & \text{if } x > 0 \end{cases}$$



$$31. f(x) = \begin{cases} x+1, & \text{if } x < 0 \\ -x+1, & \text{if } 0 \leq x \leq 2 \\ x-1, & \text{if } x > 2 \end{cases}$$

