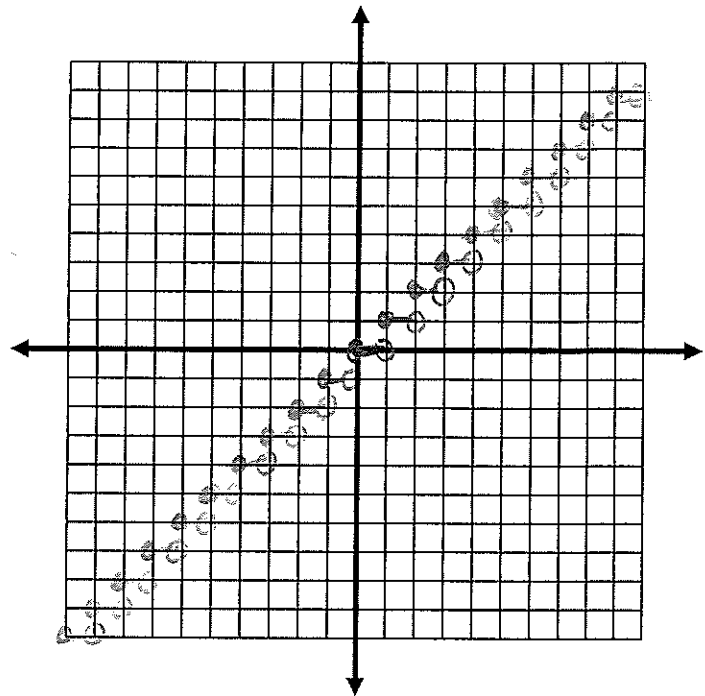


Graph and state its characteristics

1.  $f(x) = \llbracket x \rrbracket$

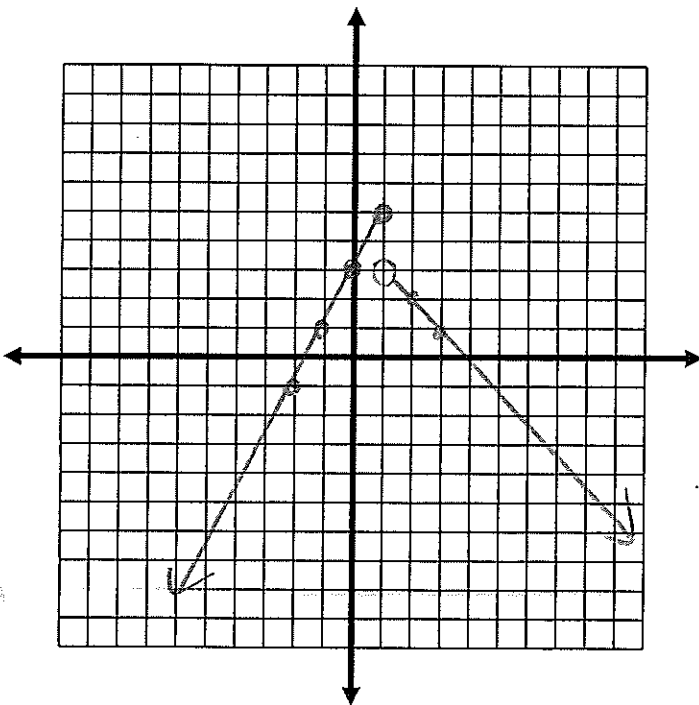
Domain  $(-\infty, \infty)$   
 Range all integers  
 x-int. (Zeros)  $(0, 1)$   
 y-int.  $(0, 0)$   
 Continuous NO  
 End Behavior as  $x \rightarrow \infty, y \rightarrow \infty$   
as  $x \rightarrow -\infty, y \rightarrow -\infty$   
 Behavior at  $x = 1$   
as  $x \rightarrow 1^+, y \rightarrow 1$   
as  $x \rightarrow 1^-, y \rightarrow 0$



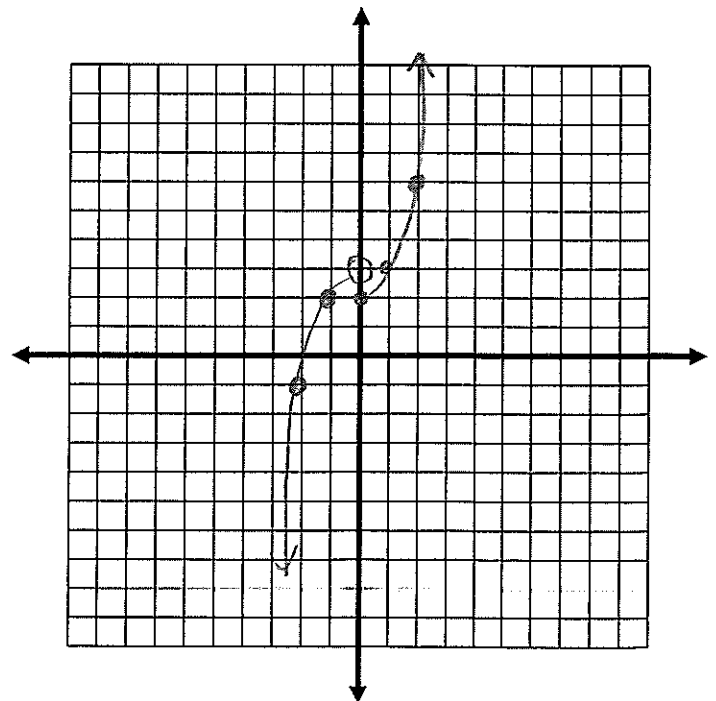
Graph each function and describe the behavior of the graph at each point of discontinuity.

2.  $f(x) = \begin{cases} 2x + 3 & \text{if } x \leq 1 \\ -x + 4 & \text{if } x > 1 \end{cases}$

3.  $f(x) = \begin{cases} 3 - x^2 & \text{if } x < 0 \\ x^2 + 2 & \text{if } x \geq 0 \end{cases}$

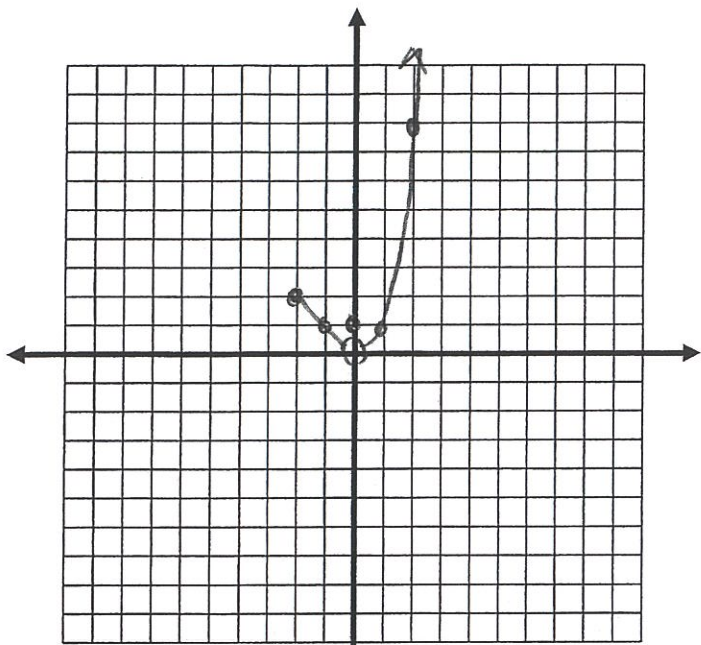


as  $x \rightarrow 1^+, y \rightarrow 3$   
 as  $x \rightarrow 1^-, y \rightarrow 5$



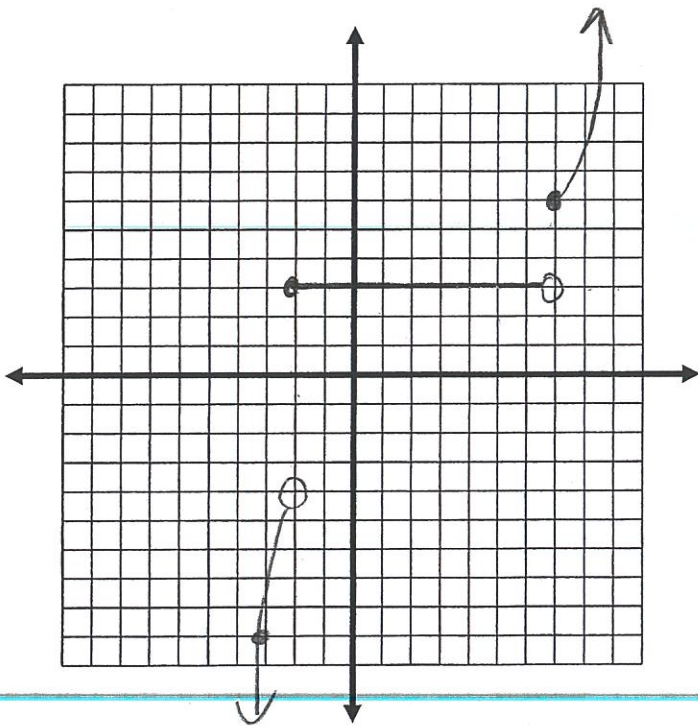
as  $x \rightarrow 0^-, y \rightarrow 3$  / as  $x \rightarrow 0^+, y \rightarrow 2$

$$4. f(x) = \begin{cases} |x| & \text{if } -2 \leq x < 0 \\ 1 & \text{if } x = 0 \\ x^3 & \text{if } x > 0 \end{cases}$$



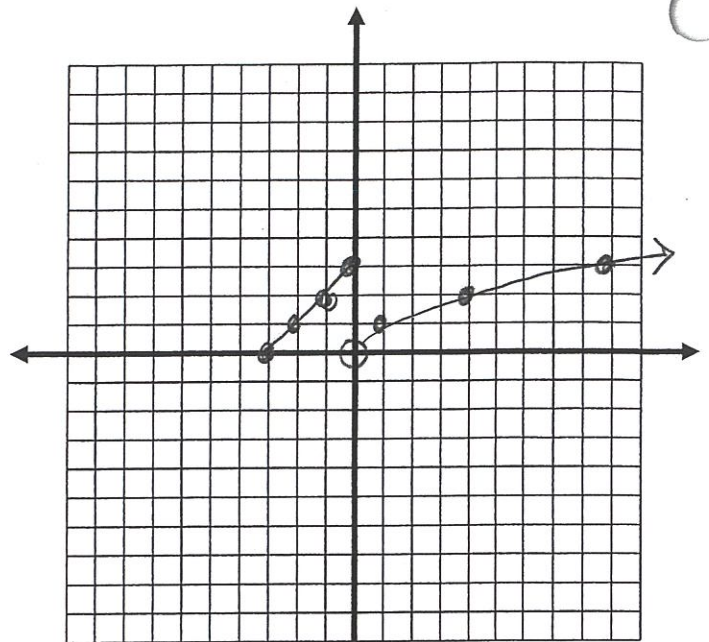
as  $x \rightarrow 0^-$ ,  $y \rightarrow 0$ , as  $x \rightarrow 0^+$ ,  $y \rightarrow 0$

$$6. f(x) = \begin{cases} -x^2 & \text{if } x < -2 \\ 3 & \text{if } -2 \leq x < 7 \\ (x-5)^2 + 2 & \text{if } x \geq 7 \end{cases}$$



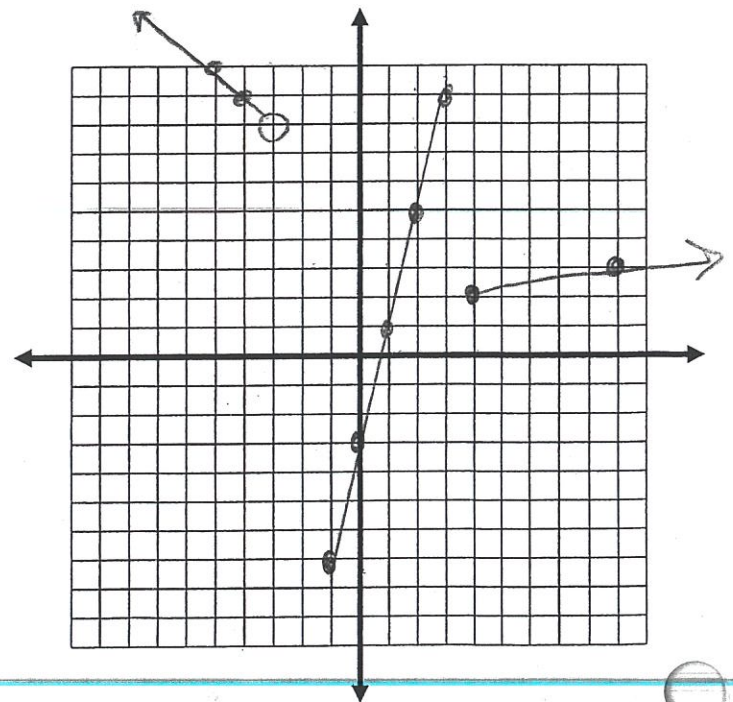
as  $x \rightarrow -2^-$ ,  $y \rightarrow -4$  / as  $x \rightarrow 7^-$ ,  $y \rightarrow 3$   
as  $x \rightarrow -2^+$ ,  $y \rightarrow 3$  / as  $x \rightarrow 7^+$ ,  $y \rightarrow 4$

$$5. f(x) = \begin{cases} 3+x & \text{if } -3 \leq x < 0 \\ 3 & \text{if } x = 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$$



as  $x \rightarrow 0^-$ ,  $y \rightarrow 3$   
as  $x \rightarrow 0^+$ ,  $y \rightarrow 0$

$$7. f(x) = \begin{cases} |x-5| & \text{if } x < -3 \\ 4x-3 & \text{if } -1 \leq x \leq 3 \\ \sqrt{x} & \text{if } x \geq 4 \end{cases}$$



Determine whether each function is continuous at the given x-value(s). If discontinuous, identify the type of discontinuity as infinite, jump, or removable.

1.  $f(x) = \sqrt{x^2 - 4}$  at  $x = -5$

continuous

2.  $f(x) = \frac{x^2 - 36}{x + 6}$  at  $x = -6$  and  $x = 6$

$x = -6$  removable /  $x = 6$  continuous

3.  $f(x) = \frac{x}{x-1}$  at  $x = 1$

$x = 1$  infinite

4.  $f(x) = \frac{2-x}{2+x}$  at  $x = -2$  and  $x = 2$

$x = -2$  infinite /  $x = 2$  continuous

5.  $f(x) = \frac{x-4}{x^2 - 5x + 4}$  at  $x = 1$  and  $x = 4$

$x = 4$  removable /  $x = 1$  infinite

6.  $f(x) = \begin{cases} 4x - 1 & \text{if } x \leq -6 \\ -x + 2 & \text{if } x > -6 \end{cases}$  at  $x = -6$

jump at  $x = -6$

7.  $f(x) = \begin{cases} 5x - 2 & \text{if } x \leq 2 \\ 4x & \text{if } x > 2 \end{cases}$  at  $x = 2$

continuous

8.  $f(x) = \llbracket x \rrbracket - 3$  at  $x = 3$  and  $x = 1.5$

as  $x \rightarrow 3^-$ ,  $y \rightarrow -1$   
as  $x \rightarrow 3^+$ ,  $y \rightarrow 0$  } jump at  $x = 3$

continuous at  $x = 1.5$

9.  $f(x) = \llbracket x - 4 \rrbracket + 5$  at  $x = 1$  and  $x = -1.5$

jump at  $x = 1$   
as  $x \rightarrow 1^+$ ,  $y \rightarrow 2$   
as  $x \rightarrow 1^-$ ,  $y \rightarrow 1$

continuous at  $x = -1.5$