2-6 Special Functions -- Piecewise and Step [Compatibility Mode] - Word
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Graph each of the following piecewise functions. State the domain and range of each piecewise function.

7. $f(x) = \begin{cases} x - 4, & x < 2 \\ 1, & x \geq 2 \end{cases}$

slope $\frac{1}{1}$ ↑→ y-int: -4

$y = 1$ horiz. line

8. $f(x) = \begin{cases} |x & \text{if } x < -3 \\ 2 & \text{if } -3 \leq x < 1 \\ -2x + 2 & \text{if } x \geq 1 \end{cases}$

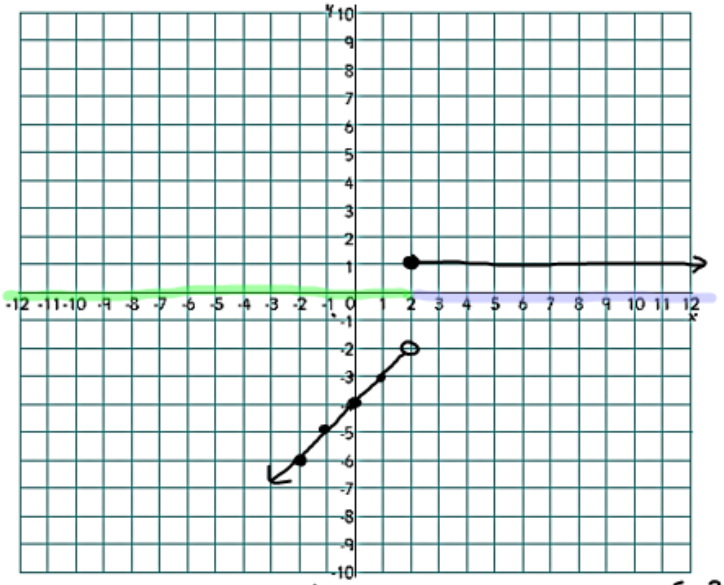
slope $\frac{1}{1}$ ↑→ y-int: 0

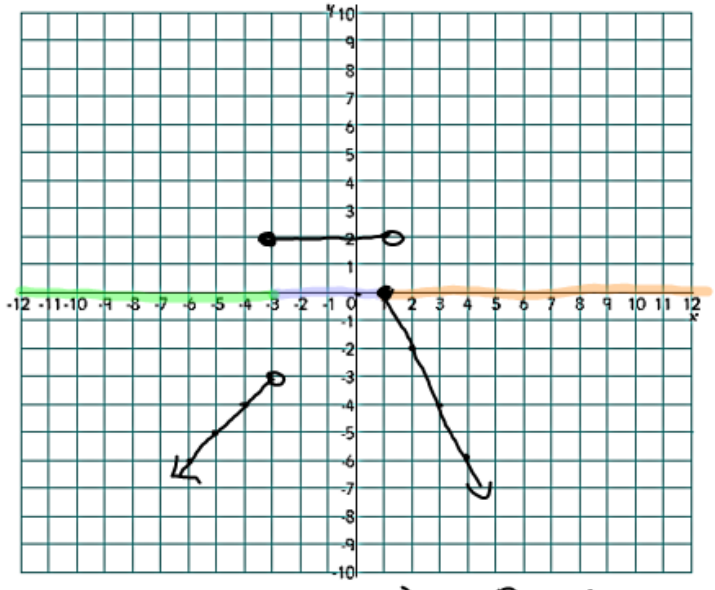
$y = 2$ horiz. line

slope $-\frac{2}{1}$ ↓→ y-int: 2

< , > open (,)

≤ , ≥ closed [,]





x-values D: $(-\infty, \infty)$ R: $(-\infty, -2) \cup \{1\}$

D: $(-\infty, +\infty)$ R: $(-\infty, 0] \cup \{2\}$

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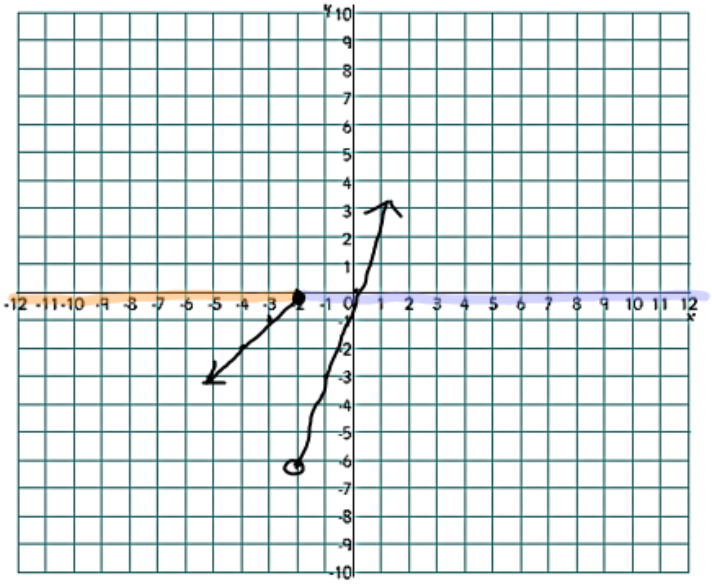
9. $f(x) = \begin{cases} x+2, & x \le -2 \\ 3x, & x > -2 \end{cases}$

slope: $\frac{1}{1}$ ↑ → y-int: 2

slope: $\frac{3}{1}$ ↑ → y-int: 0

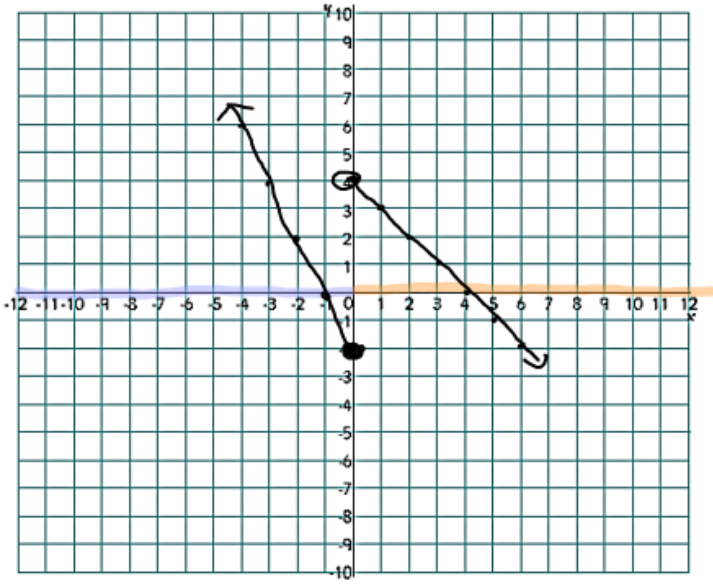


D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

10. $f(x) = \begin{cases} -1x+4, & x > 0 \\ -2x-2, & x \le 0 \end{cases}$

slope: $-\frac{1}{1}$ ↓ → y-int: 4

slope: $-\frac{2}{1}$ ↓ → y-int: -2



D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

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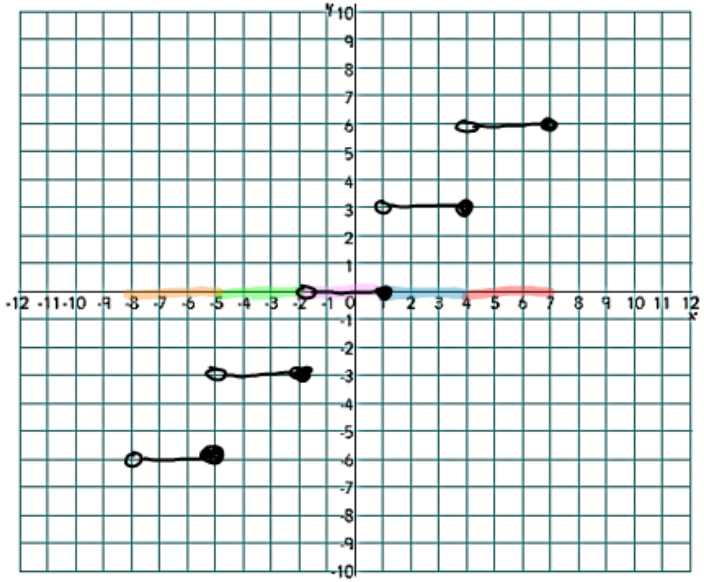
Step Function: a function whose graph is a series of horizontal lines.

Graph each step function. State the domain and range of each step function.

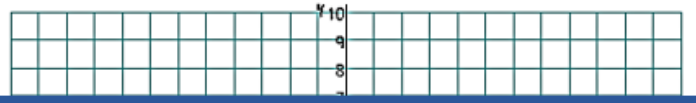
11. $f(x) = \begin{cases} -6, & -8 < x \le -5 \\ -3, & -5 < x \le -2 \\ 0, & -2 < x \le 1 \\ 3, & 1 < x \le 4 \\ 6, & 4 < x \le 7 \end{cases}$



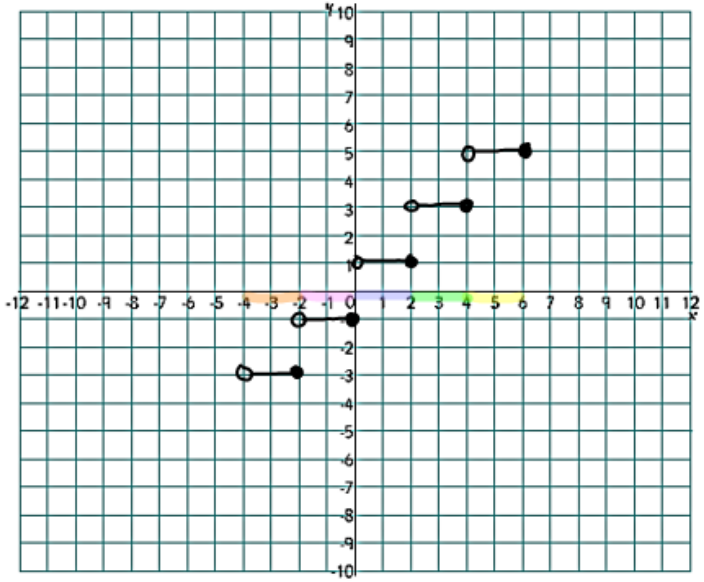
D: $(-8, 7]$

R: $\{-6, -3, 0, 3, 6\}$

$\begin{cases} -3, & -4 < x \le -2 \\ & \end{cases}$



12. $f(x) = \begin{cases} -3, & -4 < x \le -2 \\ -1, & -2 < x \le 0 \\ 1, & 0 < x \le 2 \\ 3, & 2 < x \le 4 \\ 5, & 4 < x \le 6 \end{cases}$



D: $(-4, 6]$

R: $\{-3, -1, 1, 3, 5\}$

13. One psychologist charges for counseling sessions at the rate of $85 per hour or any fraction thereof. Draw a graph that represents the situation.

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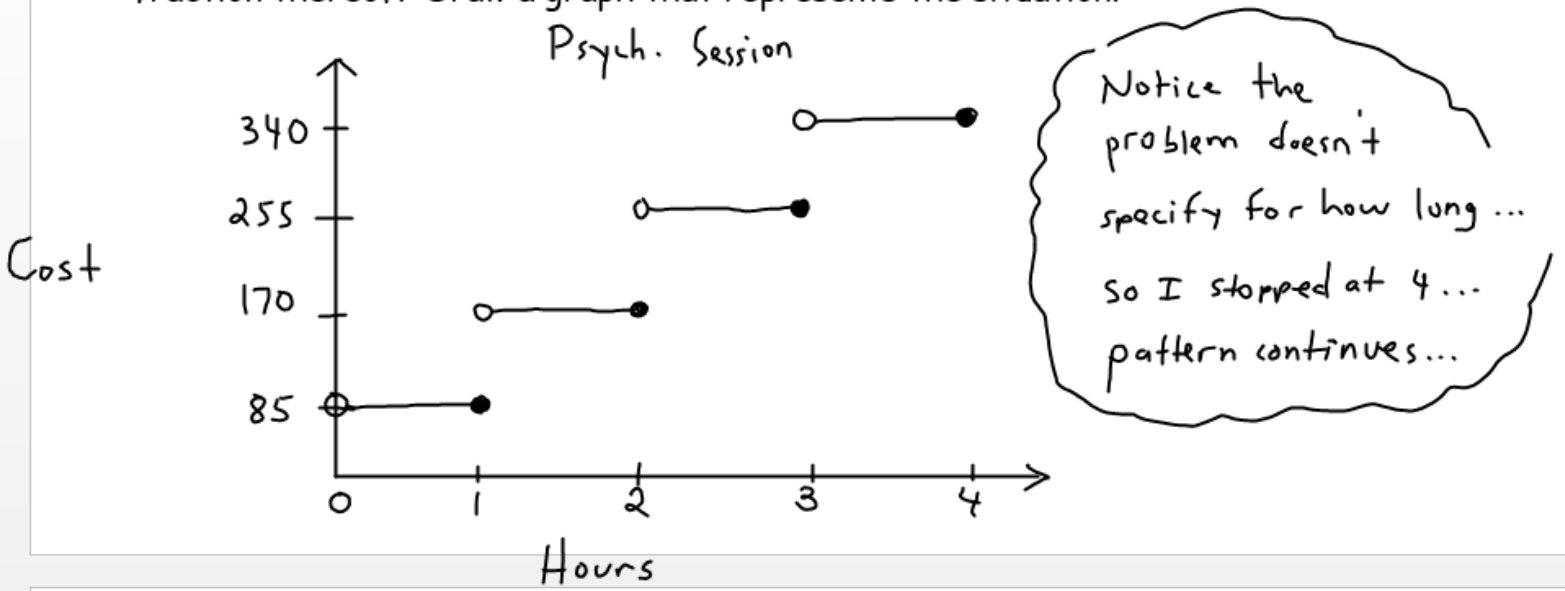

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Evaluate each function for a given value of x.

14. $f(x) = \begin{cases} -2x+1 & x \le 2 \\ 5x-4 & x > 2 \end{cases}$

"-4 less than 2"

$f(-4) = -2(-4)+1 = 8+1 = 9$

"8 > 2"

$f(8) = 5(8)-4 = 40-4 = 36$

$f(2) = -2(2)+1 = -4+1 = -3$

15. $f(x) = \begin{cases} 2x+1 & x \ge 1 \\ x^2+3 & x < 1 \end{cases}$

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15. $f(x) = \begin{cases} 2x+1 & x \geq 1 \\ x^2+3 & x < 1 \end{cases}$

$f(-2) = (-2)^2+3 = (-2)(-2)+3 = 4+3 = 7$

$f(6) = 2(6)+1 = 12+1 = 13$

$f(1) = 2(1)+1 = 3$

16. $f(x) = \begin{cases} x^2-1 & x \leq 0 \\ 2x-1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$

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16. $f(x) = \begin{cases} x^2 - 1 & x \le 0 \\ 2x - 1 & 0 < x \le 5 \\ 3 & x > 5 \end{cases}$

$f(-2) = (-2)^2 - 1 = 4 - 1 = 3$

$f(0) = (0)^2 - 1 = -1$

$f(5) = 2(5) - 1 = 10 - 1 = 9$

$f(5.6) = 3$ Why?

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