

Name: _____

Date: _____

PCH : More Simplifying Expressions You Will Often see in Calculus

Ms. Loughran

Do Now:

Simplify each of the following.

$$1. \frac{(x-4)}{(\sqrt{x}-2)} \cdot \frac{(\sqrt{x}+2)}{(\sqrt{x}+2)} = \frac{\cancel{(x-4)}(\sqrt{x}+2)}{\cancel{x-4} \sqrt{x}+2}$$

$$2. \frac{x^2-1}{\sqrt{x}-1} = \frac{(x+1)(\sqrt{x}+1)\overbrace{(\sqrt{x}-1)}^{(x-1)}}{\cancel{\sqrt{x}-1}}$$
$$(x+1)(\sqrt{x}+1)$$

$$\frac{(\sqrt{x}+2)(\cancel{\sqrt{x}-2})}{\frac{(x-4)}{\cancel{\sqrt{x}-2}}} = \sqrt{x}+2$$

$$3. \frac{3-\sqrt{x}}{9-x} = \frac{\cancel{3}\sqrt{x}}{(3+\sqrt{x})(\cancel{3}-\sqrt{x})} = \frac{1}{3+\sqrt{x}}$$

$$4. \frac{\sqrt{5}-\sqrt{x}}{25-x^2} = \frac{\sqrt{5}-\sqrt{x}}{(5-x)(5+x)} = \frac{\cancel{\sqrt{5}-\sqrt{x}}}{(\sqrt{5}+\sqrt{x})\cancel{\sqrt{5}-\sqrt{x}}(5+x)}$$
$$\frac{1}{(\sqrt{5}+\sqrt{x})(5+x)}$$

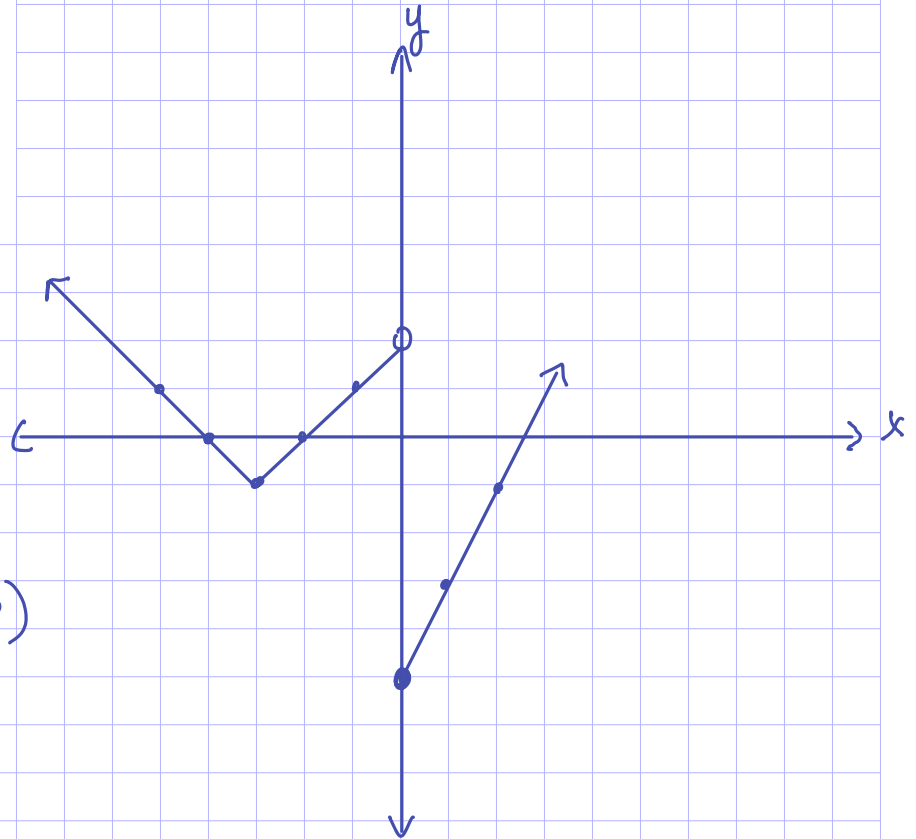
Name: _____
PCH: Piecewise Functions

Date: _____
Ms. Loughran

Do Now:

1. Graph each of the following piecewise functions on a separate piece of graph paper.

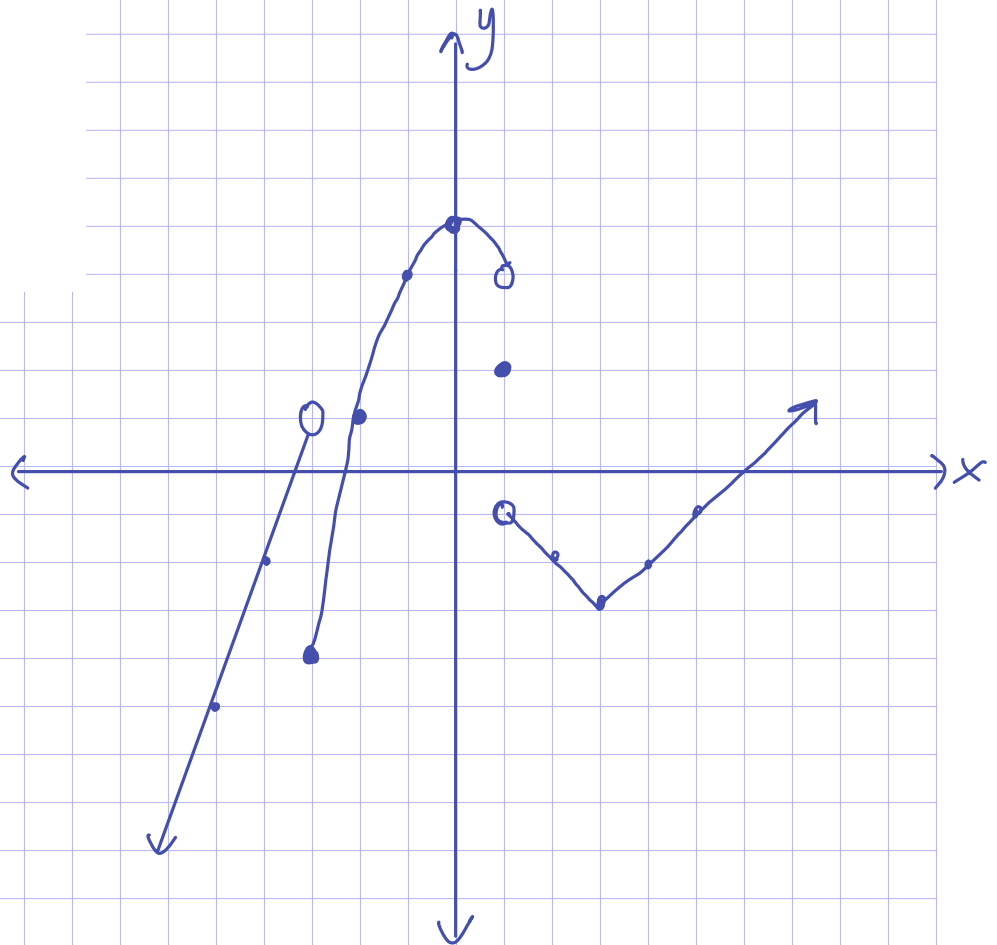
$$a) f(x) = \begin{cases} |x+3|-1 & , \text{if } x < 0 \\ 2x-5 & , \text{if } x \geq 0 \end{cases}$$



$$D_f : (-\infty, \infty)$$

$$R_f : [-5, \infty)$$

$$b) h(x) = \begin{cases} 3x+10, & x < -3 \\ -x^2+5, & -3 \leq x < 1 \\ 2, & x = 1 \\ |x-3|-3, & x > 1 \end{cases}$$



$$D_h: (-\infty, \infty)$$

$$R_h: (-\infty, \infty)$$

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PCH: Piecewise Functions

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Do Now:

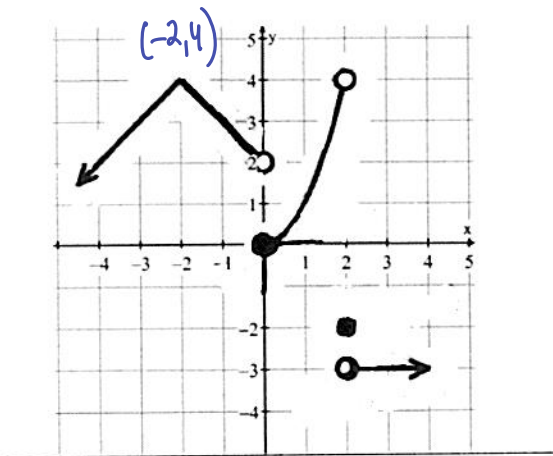
1. Graph each of the following piecewise functions on a separate piece of graph paper.

$$a) f(x) = \begin{cases} |x+3|-1, & \text{if } x < 0 \\ 2x-5, & \text{if } x \geq 0 \end{cases}$$

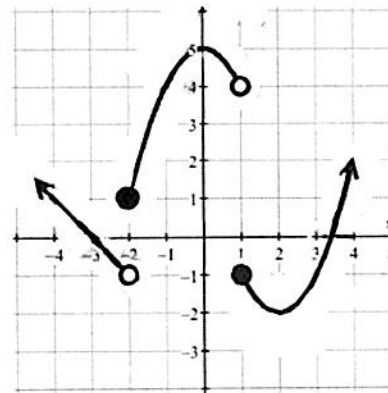
$$b) h(x) = \begin{cases} 3x+10, & x < -3 \\ -x^2+5, & -3 \leq x < 1 \\ 2, & x = 1 \\ |x-3|-3, & x > 1 \end{cases}$$

2. Write the piecewise equation of each of the functions graphed below.

a)



b)

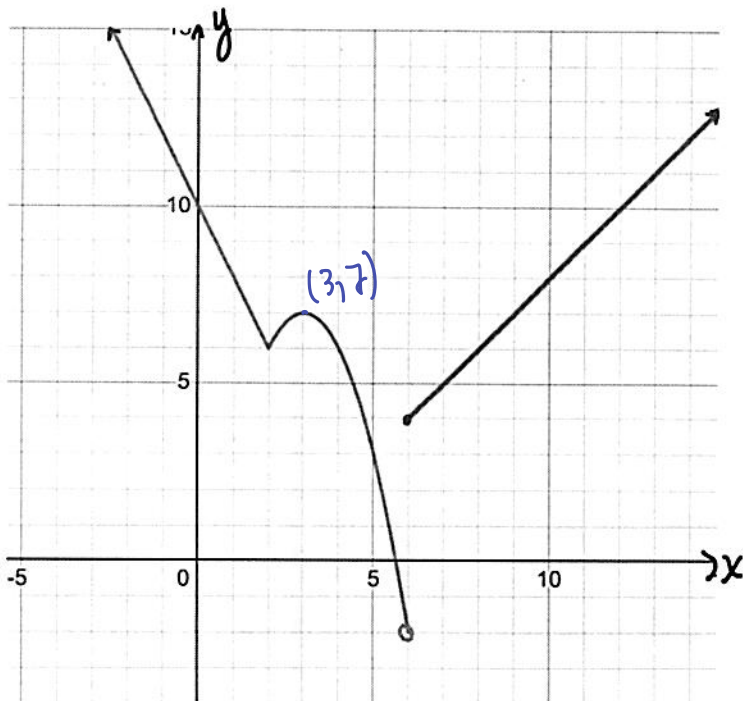


$$f(x) = \begin{cases} -|x+2|+4 & x < 0 \\ x^2 & 0 \leq x < 2 \\ -2 & x = 2 \\ -3 & x > 2 \end{cases}$$

$$f(x) = \begin{cases} -x-3 & x < -2 \\ -x^2+5 & -2 \leq x < 1 \\ (x-2)^2-2 & x \geq 1 \end{cases}$$

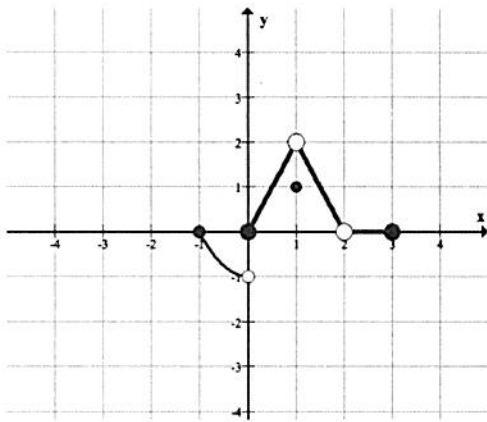
$5-x^2$

c)



$$f(x) = \begin{cases} -2x+10 & x < 2 \\ -(x-3)^2+7 & 2 \leq x < 6 \\ x-2 & x \geq 6 \end{cases}$$

d)



$$f(x) = \begin{cases} x^2-1 & -1 \leq x < 0 \\ 2x & 0 \leq x < 1 \\ 1 & x=1 \\ -2x+4 & 1 \leq x < 2 \\ 0 & 2 \leq x \leq 3 \end{cases}$$

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 PCH: Practice with Piecewise Functions

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Homework 10-17

For 1-12, evaluate the function for the given value of x .

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

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

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

- | | | | |
|------------|-----------------------|-------------|---|
| 1. $f(2)$ | 2. $f(-4)$ 3 | 3. $f(0)$ | 4. $f\left(\frac{1}{2}\right)$ 2 |
| 5. $g(7)$ | 6. $g(0)$ 5 | 7. $g(-1)$ | 8. $g(3)$ 8 |
| 9. $h(-4)$ | 10. $h(-2)$ -5 | 11. $h(-1)$ | 12. $h(6)$ -9 |

For 13-18, match the piecewise function with its graph.

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

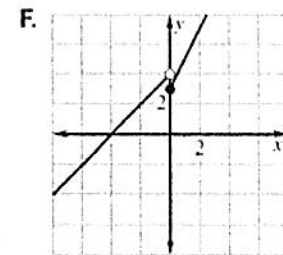
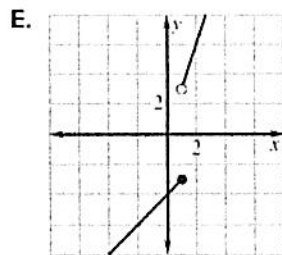
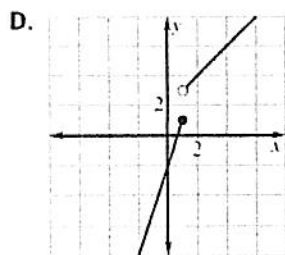
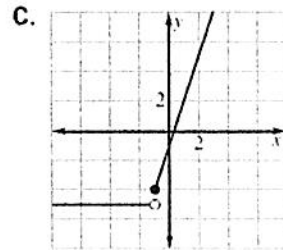
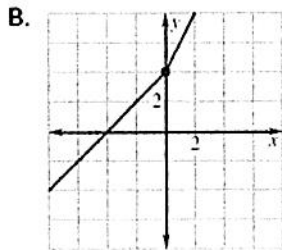
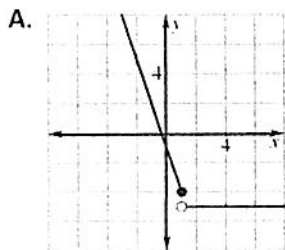
14. $f(x) = \begin{cases} x + 4, & \text{if } x \leq 0 \\ 2x + 4, & \text{if } x > 0 \end{cases}$ **B**

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

16. $f(x) = \begin{cases} 2x + 3, & \text{if } x \geq 0 \\ x + 4, & \text{if } x < 0 \end{cases}$ **F**

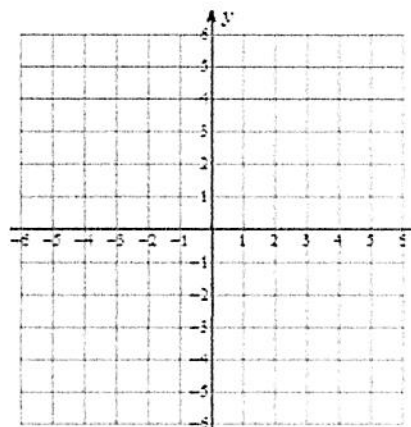
17. $f(x) = \begin{cases} 3x - 1, & \text{if } x \geq -1 \\ -5, & \text{if } x < -1 \end{cases}$

18. $f(x) = \begin{cases} -3x - 1, & \text{if } x \leq 1 \\ -5, & \text{if } x > 1 \end{cases}$ **A**



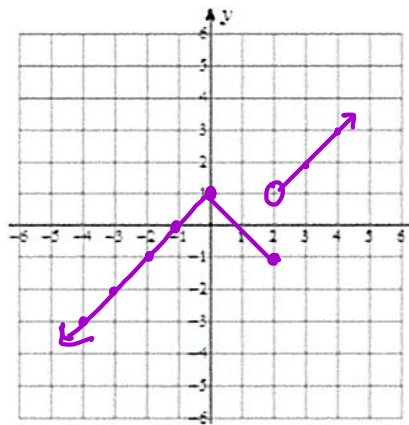
For 19- 21, graph the function.
 19.

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



20.

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

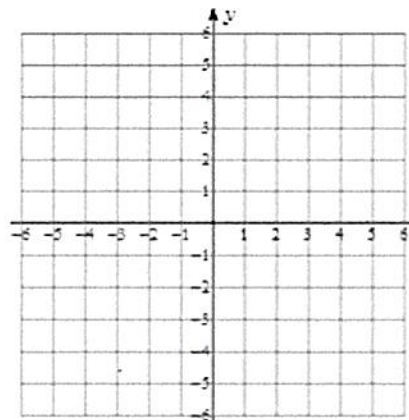


$$D_f: (-\infty, \infty)$$

$$R_f: (-\infty, \infty)$$

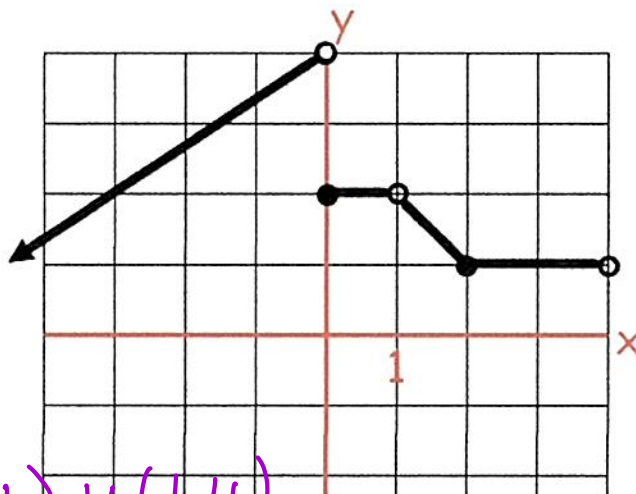
21.

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



For 22-28, write functions for each of the following piecewise graphs.

22.

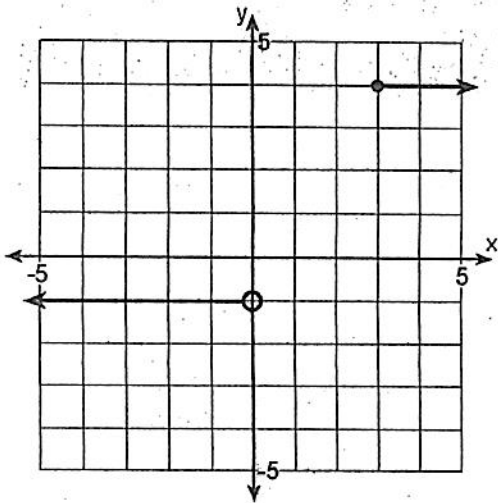


$$f(x) = \begin{cases} \frac{2}{3}x + 4 & x < 1 \\ 2 & 0 \leq x < 1 \\ -x + 3 & 1 < x < 2 \\ 1 & 2 \leq x < 4 \end{cases}$$

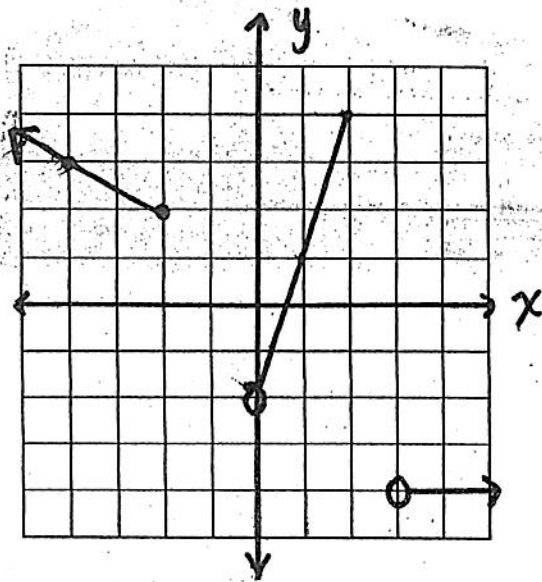
$$D: (-\infty, 1) \cup [1, 4)$$

$$R: (-\infty, 4)$$

23.



24.

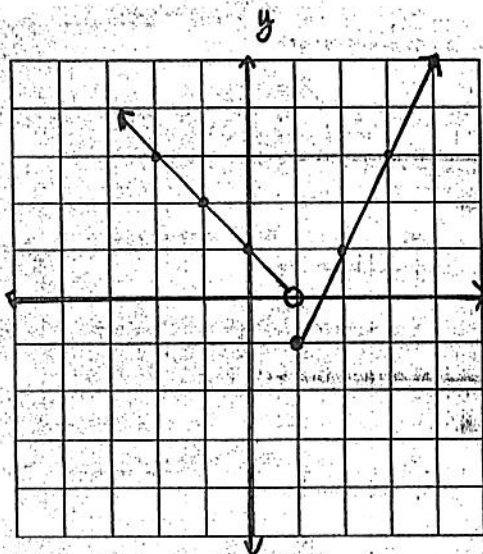


$$f(x) = \begin{cases} -\frac{1}{2}x + 1 & x < -2 \\ 3x - 2 & 0 < x \leq 2 \\ -4 & x > 3 \end{cases}$$

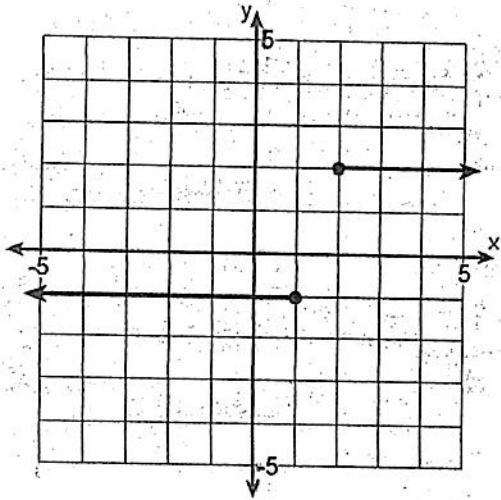
$$D: (-\infty, -2] \cup (0, 2] \cup (3, \infty)$$

$$R: \{-4\} \cup (-2, \infty)$$

25.



26.

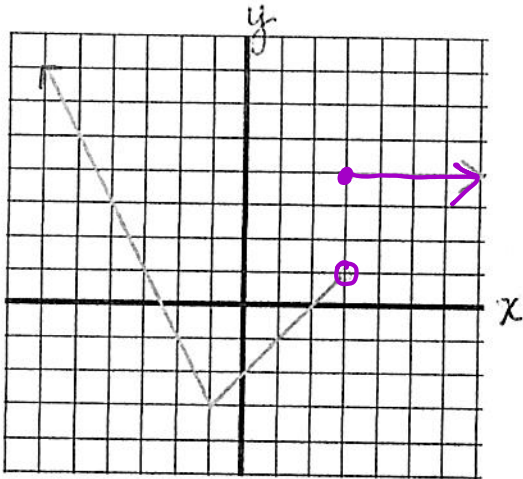


$$f(x) = \begin{cases} 2 & x \geq 2 \\ -1 & x \leq 1 \end{cases}$$

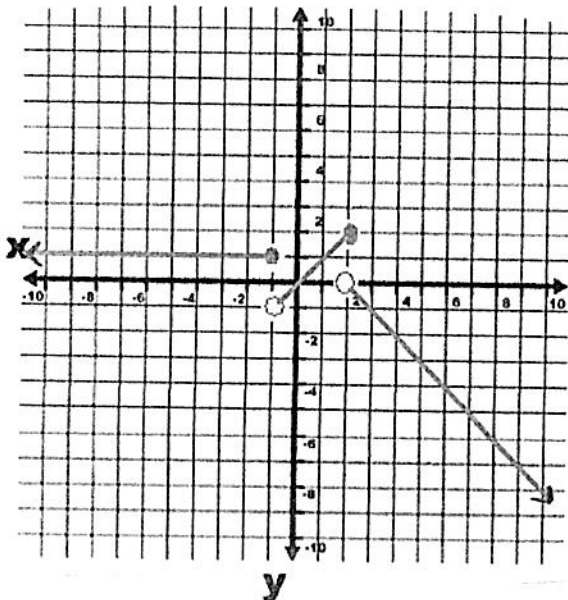
$$D: (-\infty, 1] \cup [2, \infty)$$

$$R: \{-1, 2\}$$

27.



28.



$$f(x) = \begin{cases} 1 & x \leq -1 \\ x & -1 < x \leq 2 \\ -x + 2 & x > 2 \end{cases}$$

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

$$R: (-\infty, 2]$$