

Name:

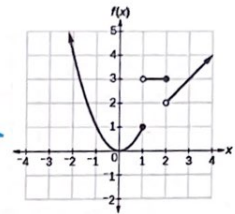
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# 3.1 Piecewise Functions Notes

## Piecewise Functions

A function built from pieces of different functions over different intervals.



## Evaluating Piecewise Functions

Ex1:  $f(x) = \begin{cases} x^2 - 1 & \text{if } x < -2 \\ 5x + 3 & \text{if } x \geq -2 \end{cases}$  find each value

a)  $f(-5)$   $\leftarrow$  -5 is less than -2 so use  $x^2 - 1$   
 $f(-5) = (-5)^2 - 1$   
 $f(-5) = 25 - 1$   
 $f(-5) = 24$

b)  $f(-2)$   $\leftarrow$  -2 is  $\geq$  -2 so use  $5x + 3$   
 $f(-2) = 5(-2) + 3$   
 $f(-2) = -10 + 3$   
 $f(-2) = -7$

Ex2:  $g(x) = \begin{cases} \frac{1}{2}x + 3 & x \leq -4 \\ -x - 1 & -4 < x < 1 \\ 2x^3 + 9 & x \geq 1 \end{cases}$

a)  $g(2)$   
 $g(2) = 2(2)^3 + 9$   
 $= 2(8) + 9$   
 $= 16 + 9$   
 $g(2) = 25$

b)  $g(-1)$   
 $g(-1) = -(-1) - 1$   
 $= 1 - 1$   
 $g(-1) = 0$

c)  $g(-6)$   
 $g(-6) = \frac{1}{2}(-6) + 3$   
 $= -3 + 3$   
 $g(-6) = 0$

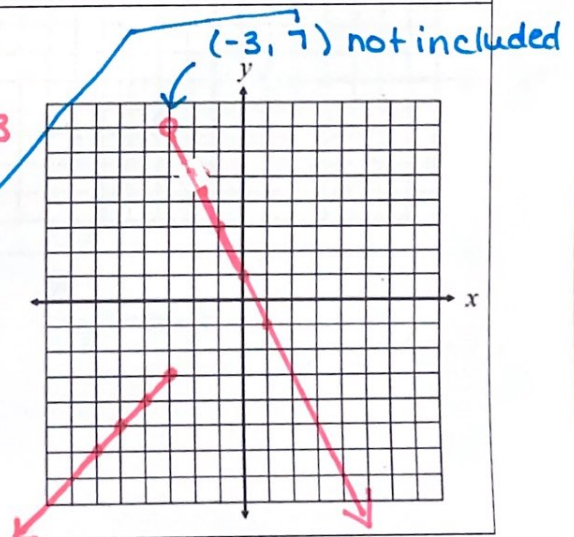
Graph each piecewise function, then identify the domain and range.

## Graphing Piecewise Functions

Ex3:

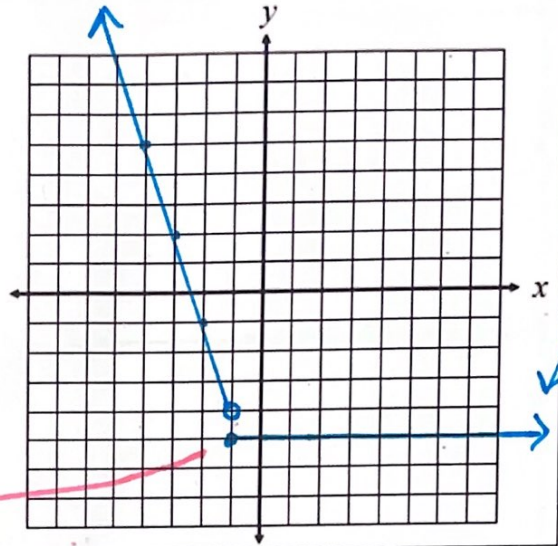
$$f(x) = \begin{cases} x & \text{if } x \leq -3 \\ -2x + 1 & \text{if } x > -3 \end{cases}$$

D:  $(-\infty, \infty)$   
R:  $(-\infty, 7)$



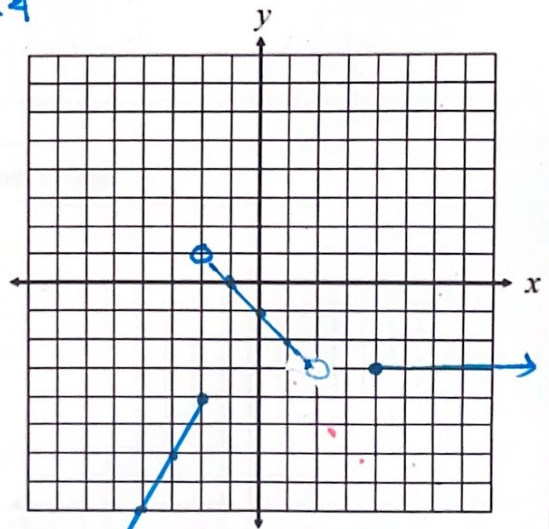
Ex4:  $g(x) = \begin{cases} -3x-7 & \text{if } x < -1 \\ -5 & \text{if } x \geq -1 \end{cases}$

D:  $(-\infty, \infty)$   
 R:  $-5 \cup (-4, \infty)$



Examples

Ex5:  $f(x) = \begin{cases} 2x & \text{if } x \leq -2 \\ -x-1 & \text{if } -2 < x < 4 \\ -3 & \text{if } x \geq 4 \end{cases}$



$y = -x - 1$

$y = -3$