

### Notes 1.3 Interpreting Graphs of Functions – Part I

#### Finding Values and Characteristics of Functions from a Graph

Remember that if  $h(3) = 2$ , that means that when

$x = \underline{3}$ , then  $y = \underline{2}$ .

Find each of the following function values using the graph.  $F(x)$  is the dashed line graph.  $G(x)$  is the solid line graph.

$F(-1) = \underline{6}$

$F(-9) = \underline{\text{undefined}}$

$F(5) = \underline{-5}$

$G(-3.2) = \underline{\approx 1.8}$

$G(-11) = \underline{-2}$

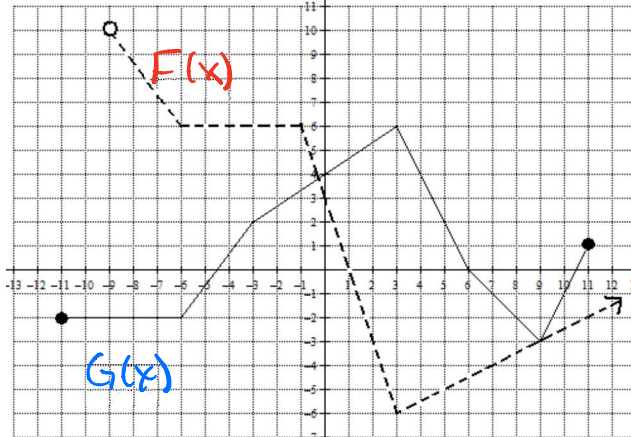
$G(7) = \underline{-1}$

$$\begin{aligned} (F-G)(-3) &= F(-3) - G(-3) \\ &= 6 - 2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} 2 \cdot F(-4) - G(-6) &= 2 \cdot 6 - (-2) \\ &= 12 + 2 \\ &= 14 \end{aligned}$$

$$\begin{aligned} \frac{G(-8) + F(0)}{G(0)} &= \frac{-2 + 3}{4} \\ &= \frac{1}{4} \end{aligned}$$

$$\begin{aligned} -2 \cdot G(8) - 3 \cdot F(17) &= \\ &= -2(-2) - 3(1) \\ &= 4 - 3 \\ &= 1 \end{aligned}$$



The value(s) of  $x$  such that  $F(x) = -6$   $x = \underline{3}$

The value(s) of  $x$  such that  $F(x) = -3$   
 $x = \underline{2}$  or  $x = \underline{9}$

The value(s) of  $x$  such that  $F(x) = 6$   
 $[-4, -1]$  or  $x = \underline{27}$

The value(s) of  $x$  such that  $G(x) = -6$   
 $\underline{\text{none}}$

The value(s) of  $x$  such that  $G(x) = -3$   
 $x = \underline{9}$

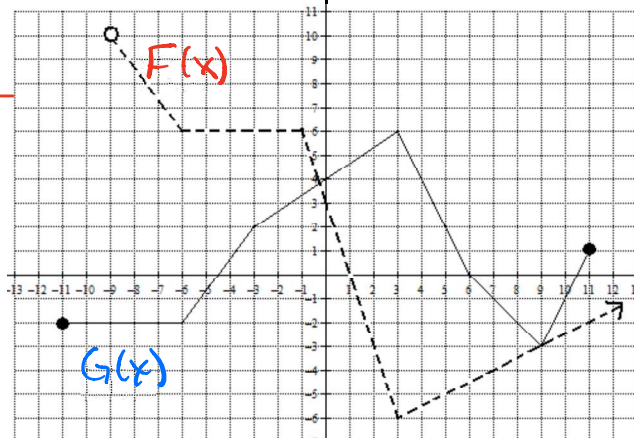
The value(s) of  $x$  such that  $G(x) = 4$   
 $x = \underline{0}$  or  $x = \underline{4}$

If  $p(x) = x^2 + 2x - 13$ , for what values of  $x$  is  $p(x) = G(-3)$ ?

$$\begin{aligned} x^2 + 2x - 13 &= 2 \\ x^2 + 2x - 15 &= 0 \\ (x+5)(x-3) &= 0 \\ \left. \begin{aligned} x+5 &= 0 \\ x &= -5 \end{aligned} \right\} \left. \begin{aligned} x-3 &= 0 \\ x &= 3 \end{aligned} \right. \end{aligned}$$

If  $q(x) = -3|x - 3| + 4$ , then for what value(s) of  $x$  is  $q(x) = F(5)$ ?

$$\begin{aligned} -3|x-3| + 4 &= -5 \\ -3|x-3| &= -9 \\ |x-3| &= 3 \\ x-3 &= \pm 3 \\ x &= 3 \pm 3 \\ x &= \underline{6, 0} \end{aligned}$$



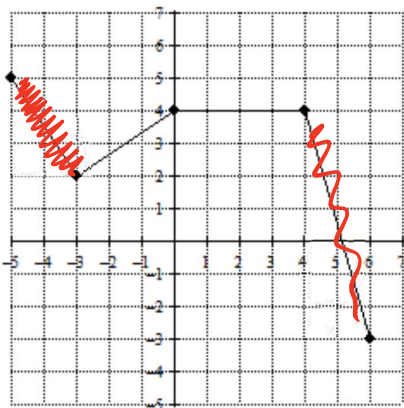
When handed a three page short story and asked to read it, where do you begin reading?

When you read a graph in mathematics, the same is true. The graph is to be read from left to right.

**Intervals of Increasing, Decreasing, and Constant Function Values**

Use a marker, highlighter or colored pencil and trace, from left to right, any intervals on which the graph of the function below is increasing, decreasing and constant.

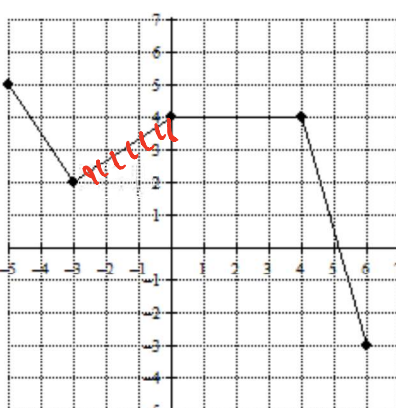
Decreasing



Identify the interval of values on along the  $x$  – axis for the portion of the graph that is highlighted.

$(-5, -3) \cup (4, 6)$

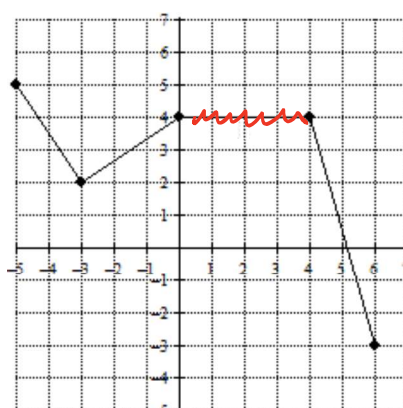
Increasing



Identify the interval of values on along the  $x$  – axis for the portion of the graph that is highlighted.

$(-3, 0)$

Constant



Identify the interval of values on along the  $x$  – axis for the portion of the graph that is highlighted.

$(0, 4)$

Should your intervals identified above be identified as closed intervals (i.e., use of brackets) or open intervals (i.e., use of parenthesis)? Give a reason for your choice.

The intervals should be open b/c at the endpoints of the intervals, the graph is not increasing, decreasing or constant

Identify the domain of the graphed function:  $[-5, 6]$

Identify the range of the graphed function:  $[-3, 5]$

### Comparing Function Values to Zero

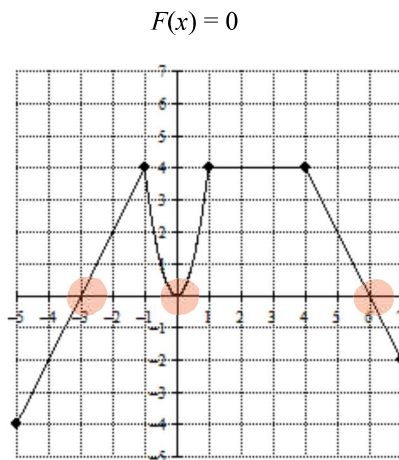
Which variable,  $x$  or  $y$ , does the function notation  $F(x)$  represent?  $y$

If  $F(x) = 0$  for a given point on a graph, then where is that point located?  $x$ -axis

If  $F(x) > 0$  for a given point on a graph, then where is that point located? above  $x$ -axis

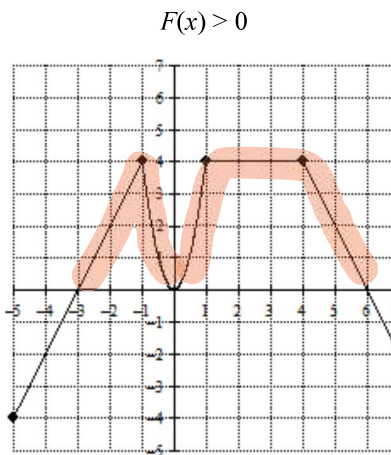
If  $F(x) < 0$  for a given point on a graph, then where is that point located? below  $x$ -axis

Use a marker, highlighter or colored pencil and trace the graph from left to right for any value(s) or intervals on which the graph of  $F(x) = 0$ ,  $F(x) > 0$ , or  $F(x) < 0$ .



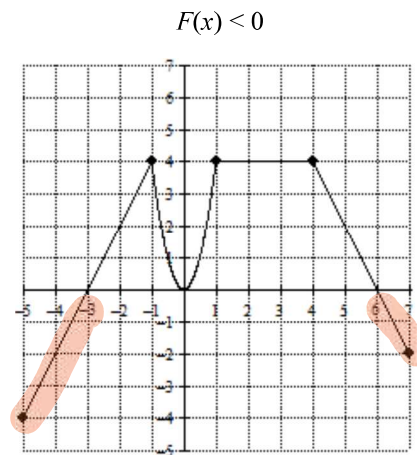
Identify the  $x$ -values for the highlighted portion of the graph.

$$x = -3, 0, 6$$



Identify the  $x$ -values for the highlighted portion of the graph.

$$(-3, 0) \cup (0, 6)$$



Identify the  $x$ -values for the highlighted portion of the graph.

$$[-5, -3) \cup (6, 7]$$

Again, should your intervals identified above be identified as closed intervals (i.e., use of brackets) or open intervals (i.e., use of parenthesis)? Give a reason for your choice.

The intervals might be open or closed depending if the endpoint is included.

Identify the domain of the graphed function:  $[-5, 7]$

Identify the range of the graphed function:  $[-4, 4]$

