Notes 1.4 Interpreting Graphs of Functions – Part II
Finding Values and Characteristics of Functions from a Graph

Comparing Two Functions to Each Other

Which variable, x or y, do the function notations $F(x)$ and $G(x)$ represent? $F(x) = G(x) = y$

If $F(x) = G(x)$, what must be graphically true? If $F(x) = G(x)$, their graphs intersect

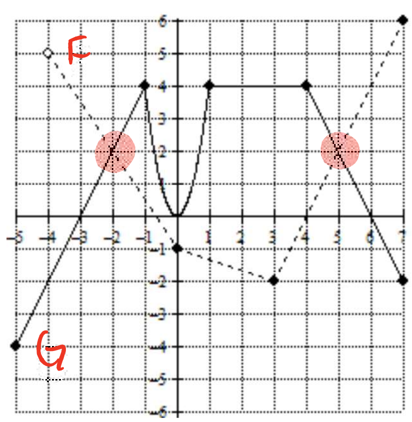
If $F(x) > G(x)$, what must be graphically true? If $F(x) > G(x)$, $F(x)$ is above $G(x)$

If $F(x) < G(x)$, what must be graphically true? If $F(x) < G(x)$, $F(x)$ is below $G(x)$

$F(x)$ and $G(x)$ can only be compared on the interval $(-4, 7]$ because that is the interval of values where BOTH graphs exist simultaneously.

In the graphs below, $F(x)$ is the dashed line graph. $G(x)$ is the solid line graph. 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 $F(x) = G(x)$, $F(x) > G(x)$, or $F(x) < G(x)$.

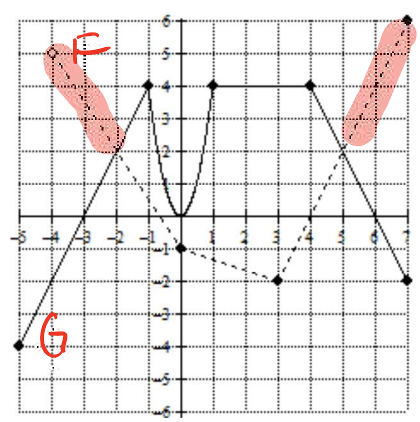
$F(x) = G(x)$



Identify the x – values for the highlighted portion of the graph.

$x = -2$ or $x = 5$

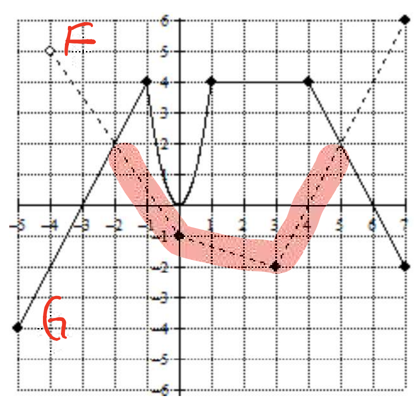
$F(x) > G(x)$



Identify the x – values for the highlighted portion of the graph.

$(-4, -2) \cup (5, 7]$

$F(x) < G(x)$



Identify the x – values for the highlighted portion of the graph.

$(-2, 5)$

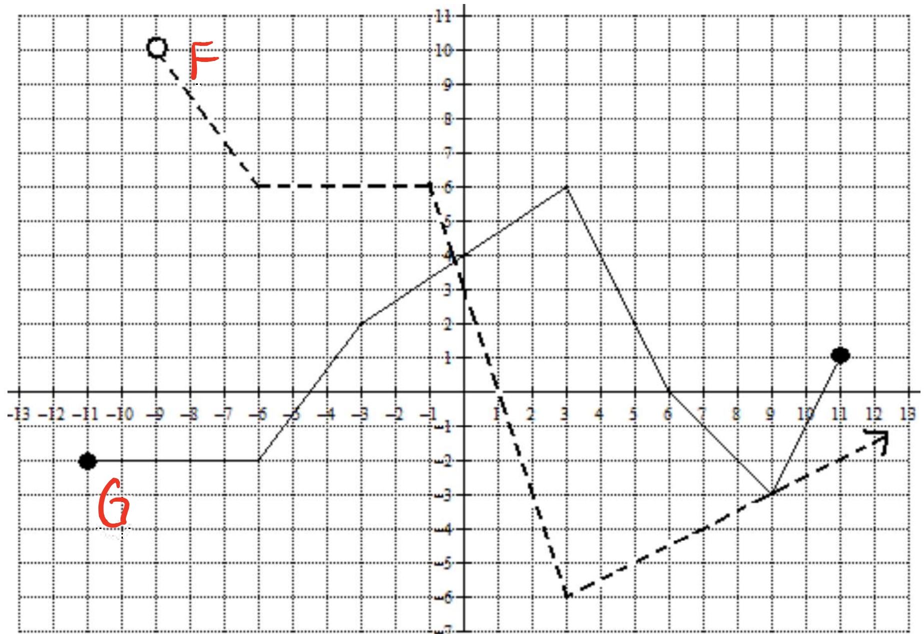
$-2 < x < 5$

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 can be a mixture of open and closed depending on the behavior of the endpoint.

Identify the domain of the graphed functions: $F(x)$: $(-4, 7]$ $G(x)$: $[-5, 7]$

Identify the range of the graphed functions: $F(x)$: $[-2, 6]$ $G(x)$: $[-4, 4]$

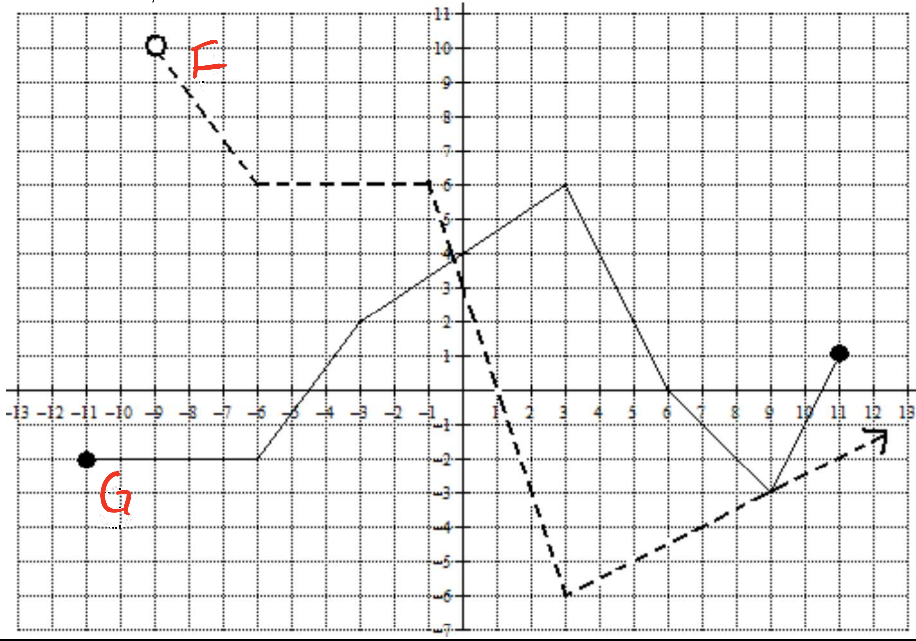


$F(x)$ is the dashed line graph to the right.

$G(x)$ is the solid line graph to the right.

For each indicated quantity, write in words what you are asked to find. Then, find the value(s) or interval(s) of values indicated using the graphs.

The value(s) of x such that $F(x) = 0$ If $F(x)=0$, then the graph of $F(x)$ is on the x-axis $x=1$ or $x=15$	The value(s) of x such that $G(x) = 0$ If $G(x)=0$, then the graph of $G(x)$ is on the x-axis $x=-4.5, 6, 10.5$	The value(s) of x such that $F(x) = G(x)$ If $F(x)=G(x)$, then the graphs of $F(x)$ and $G(x)$ intersect. $x = -1/4, 9$
The value(s) of x such that $F(x) < G(x)$. If $F(x) < G(x)$ then $F(x)$ is below the graph of $G(x)$ $(-\frac{1}{4}, 9) \cup (9, 11]$	The value(s) of x such that $F(x) > G(x)$ If $F(x) > G(x)$ then $F(x)$ is above the graph of $G(x)$ $(-9, -\frac{1}{4})$	The value(s) of x such that $F(x) > 0$. If $F(x) > 0$, then the graph of $F(x)$ is above the x-axis. $(-9, 1) \cup (15, \infty)$
The value(s) of x such that $G(x)$ is increasing. If $G(x)$ is increasing then $G(x)$ is rising from left to right. $(-6, 3) \cup (9, 11)$	The value(s) of x such that $G(x)$ is decreasing. If $G(x)$ is decreasing then $G(x)$ is falling from left to right. $(3, 9)$	The value(s) of x such that $G(x)$ is constant. If $G(x)$ is constant, then the graph of $G(x)$ is horizontal. $(-11, -6)$

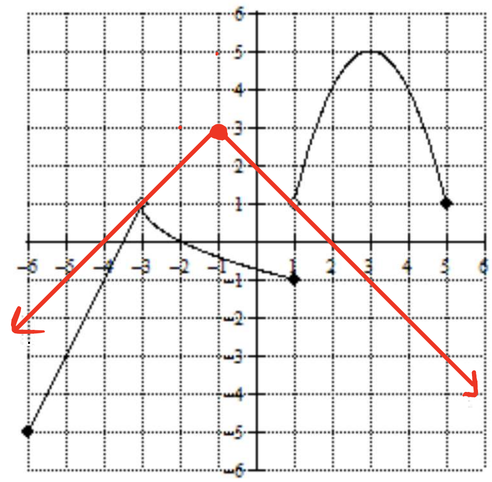


The value(s) of x such that $F(x)$ is increasing.	The value(s) of x such that $F(x)$ is decreasing.	The value(s) of x such that $F(x)$ is constant.
$(3, \infty)$	$(-9, -6) \cup (-1, 3)$	$(-6, -1)$
The value(s) of x such that $F(x) < 0$	**The value(s) of x such that $F(x) \cdot G(x) < 0$.**	**The value(s) of x such that $F(x) \cdot G(x) > 0$.**
If $F(x) > 0$, then the graph of $F(x)$ is below the x-axis. $(1, 15)$	If $F(x) \cdot G(x) < 0$, the graphs of $F(x)$ and $G(x)$ are on opposite sides of the x-axis. $(-9, -4.5) \cup (1, 6) \cup (10.5, 11)$	If $F(x) \cdot G(x) > 0$, the graphs of $F(x)$ and $G(x)$ are on same side of the x-axis. $(-4.5, 1) \cup (6, 10.5)$

Identify the equation of $h(x)$.

$$h(x) = \begin{cases} 2x+7 & -6 \le x < -3 \\ -\sqrt{x+3}+1 & -3 < x \le 1 \\ -(x-3)^2+5 & 1 < x \le 5 \end{cases}$$

Graph of $h(x)$



Identify the domain of $h(x)$

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

Identify the range of $h(x)$.

$[-5,5]$

If $p(x) = -|x+1|+3$, identify the value(s) of x for which $p(x) = h(x)$. Explain your reasoning.

graph

There are no x-values for which $p(x) = h(x)$ because the graphs of $p(x)$ and $h(x)$ never intersect.

Identify the value(s) of x for which $h(x) = 0$.

$x = -3.5, -2$

Identify the value(s) of x for which $h(x) > 0$.

$(-3.5,-3)\cup(-3,-2)\cup(1,5]$

Identify the value(s) of x for which $h(x) < 0$.

$[-6,-3.5)\cup(-2,1]$

Identify the value(s) of x for which $h(x) \le 0$.

$[-6,-3.5]\cup[-2,1]$

Identify the value(s) of x for which $h(x) \ge 0$.

$[-3.5,-3)\cup(-3,-2]\cup(1,5]$

For what value(s) of x is $p(x) > h(x)$?

$[-6,-3)\cup(-3,1]$

For what value(s) of x is $p(x) < h(x)$?

$(1,5]$

For what value(s) of x is $h(x)$ increasing?

$(-6,-3)\cup(1,3)$

For what value(s) of x is $h(x)$ decreasing?

$(-3,1)\cup(3,5)$