

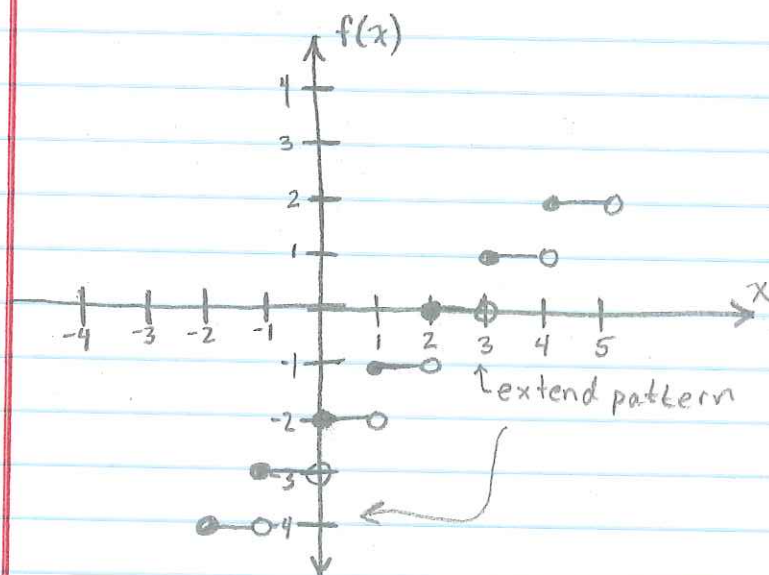
Section 2-6 Special Functions

Graph each function. Identify the domain & range

(39) $f(x) = \llbracket x \rrbracket - 2$

This is a "greatest integer function"

x	$f(x)$	
2	0	$\leftarrow \llbracket 2 \rrbracket - 2 = 2 - 2 = 0$
1.1 - 1.9	-1	$\leftarrow \llbracket 1.5 \rrbracket - 2 = 1 - 2 = -1$
1	-1	$\leftarrow \llbracket 1 \rrbracket - 2 = 1 - 2 = -1$
0.1 - 0.9	-2	$\leftarrow \llbracket 0.5 \rrbracket - 2 = 0 - 2 = -2$
0	-2	$\leftarrow \llbracket 0 \rrbracket - 2 = 0 - 2 = -2$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{f(x) \mid f(x) \in \mathbb{Z}\}$
 $\uparrow$ All Integers

Students need to know...

$\llbracket x \rrbracket$ the "greatest integer" will be the largest integer that is less than or equal to value of x

examples

$$\llbracket 4.7 \rrbracket = 4$$

$$\llbracket -2.5 \rrbracket = -3$$

$$\llbracket 4.1 \rrbracket = 4$$

$$\llbracket 8 \rrbracket = 8$$

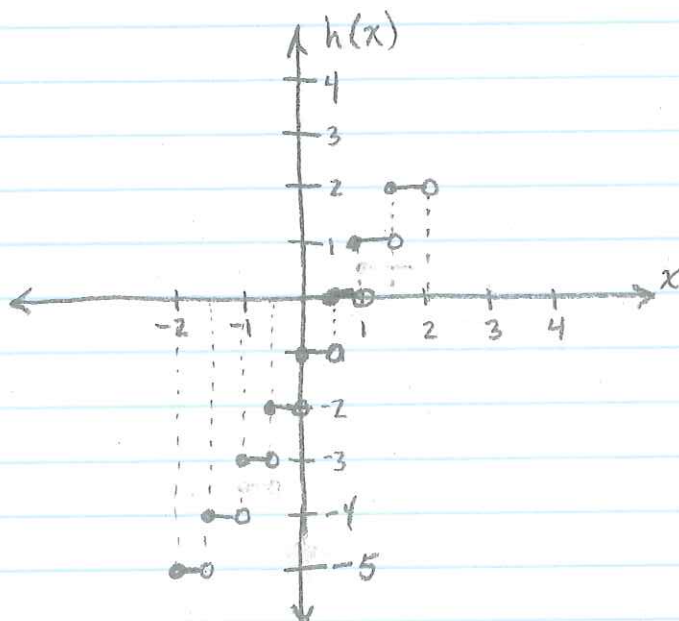
The graph of $\llbracket x \rrbracket$ is a

"STEP Function"

Chapter 2.6 continued

40) $h(x) = \lfloor 2x - 1 \rfloor$

x	$h(x)$
-2	-5 $\Leftarrow \lfloor 2(-2) - 1 \rfloor = \lfloor -4 - 1 \rfloor = \lfloor -5 \rfloor = -5$
-1.8	-5 $\Leftarrow \lfloor 2(-1.8) - 1 \rfloor = \lfloor -3.6 - 1 \rfloor = \lfloor -4.6 \rfloor = -5$
-1.5	-4 $\Leftarrow \lfloor 2(-1.5) - 1 \rfloor = \lfloor -3 - 1 \rfloor = \lfloor -4 \rfloor = -4$
-1.1 $\rightarrow$ -1.4	-4
-1	-3
-0.6 $\rightarrow$ -0.9	-3
-0.5	-2

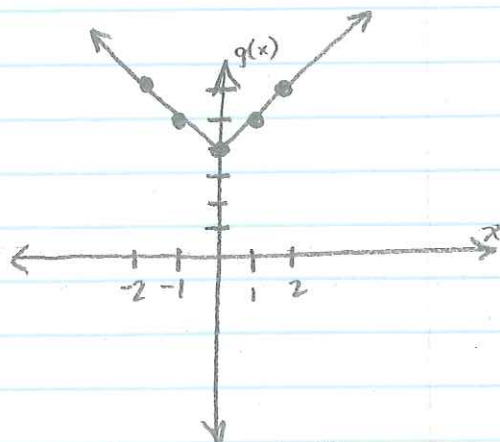


Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{h(x) \mid h(x) \in \mathbb{Z}\}$

41) $g(x) = |x| + 4$

x	$g(x)$
-2	6 $\Leftarrow -2 + 4 = 2 + 4 = 6$
-1	5 $\Leftarrow -1 + 4 = 1 + 4 = 5$
0	4 $\Leftarrow 0 + 4 = 0 + 4 = 4$
1	5 $\Leftarrow 1 + 4 = 1 + 4 = 5$
2	6 $\Leftarrow 2 + 4 = 2 + 4 = 6$



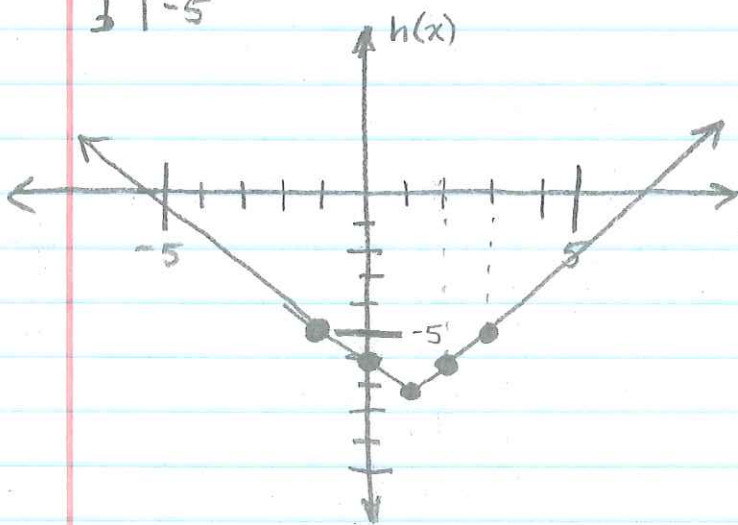
Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{g(x) \mid g(x) \geq 4\}$

Chapter 2.6 continued

42) $h(x) = |x-1| - 7$

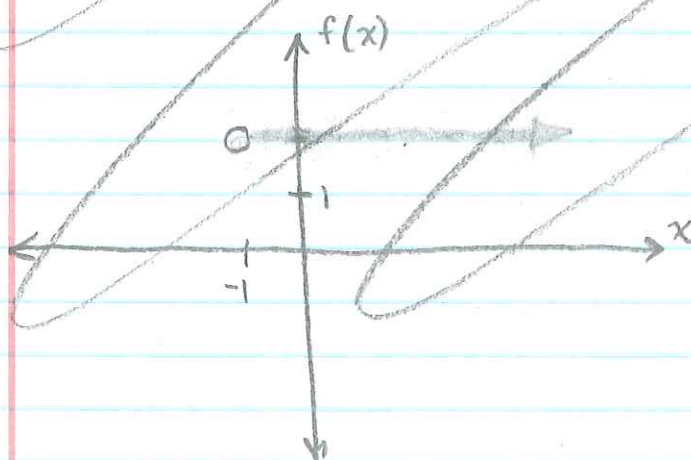
x	$h(x)$	
-1	-5	$ -1-1 -7 \Rightarrow -2 -7 \Rightarrow 2-7 = -5$
0	-6	$ 0-1 -7 \Rightarrow -1 -7 \Rightarrow 1-7 = -6$
1	-7	$ 1-1 -7 \Rightarrow 0 -7 \Rightarrow 0-7 = -7$
2	-6	$ 2-1 -7 \Rightarrow 1 -7 \Rightarrow 1-7 = -6$
3	-5	



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{h(x) \mid h(x) \geq -7\}$

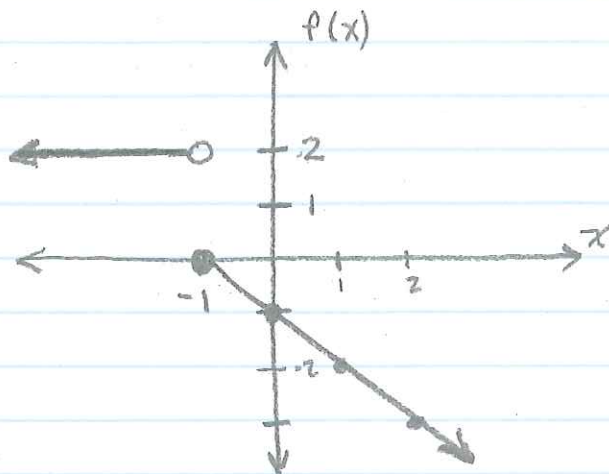
43) $f(x) = \begin{cases} 2 & \text{if } x < -1 \\ x-1 & \text{if } x \geq -1 \end{cases}$



x	$f(x)$	
-1	0	$-(-1)-1 = 1-1$
0	-1	$-(0)-1 = 0-1$
1	-2	$-(1)-1 = -2$
2	-3	

Chapter 2.6

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

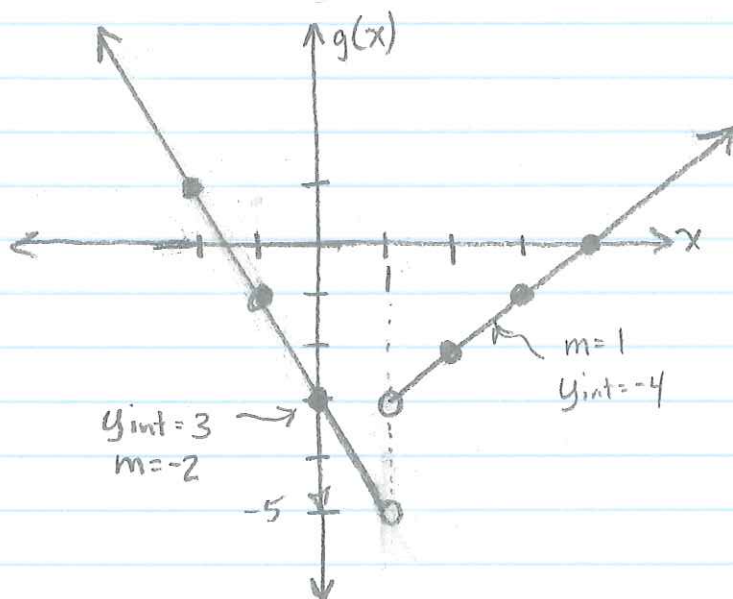


x	$f(x)$	
-1	0	$-(-1)-1 \Rightarrow 1-1$
0	-1	$-(0)-1 \Rightarrow 0-1$
1	-2	$-(1)-1 \Rightarrow -2$
2	-3	$-(2)-1 \Rightarrow -3$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{f(x) \mid f(x) \leq 0, f(x) = 2\}$

44) $g(x) = \begin{cases} -2x-3 & \text{if } x < 1 \\ x-4 & \text{if } x > 1 \end{cases} \rightsquigarrow \begin{matrix} y_{\text{int}} = -3, m = -2 \\ y_{\text{int}} = -4, m = 1 \end{matrix}$

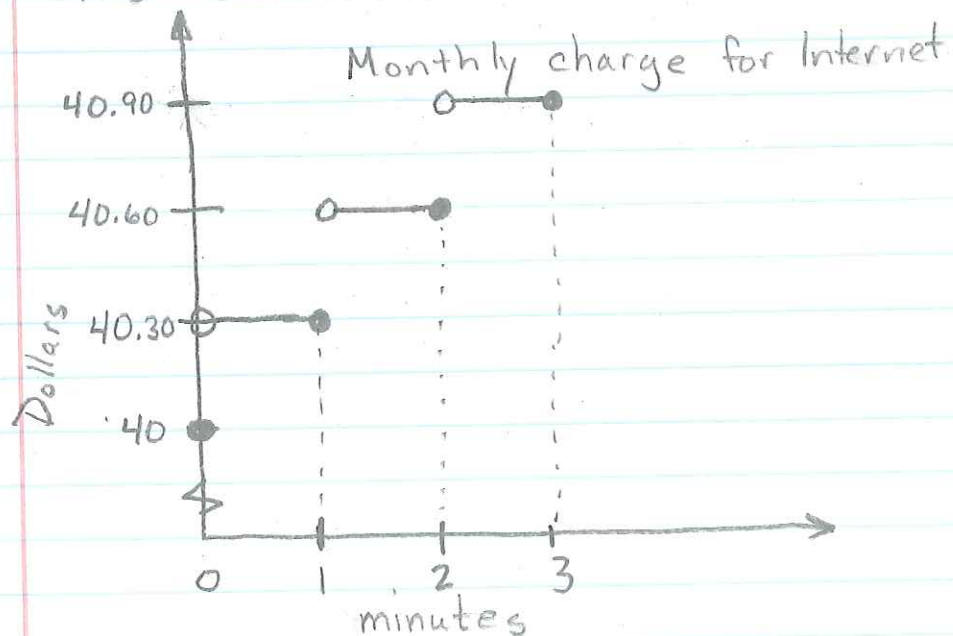


Domain: $\{x \mid x \in \mathbb{R}, x \neq 1\}$

Range: $\{g(x) \mid g(x) > -5\}$

Chapter 2.6 continued

- 45) A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation



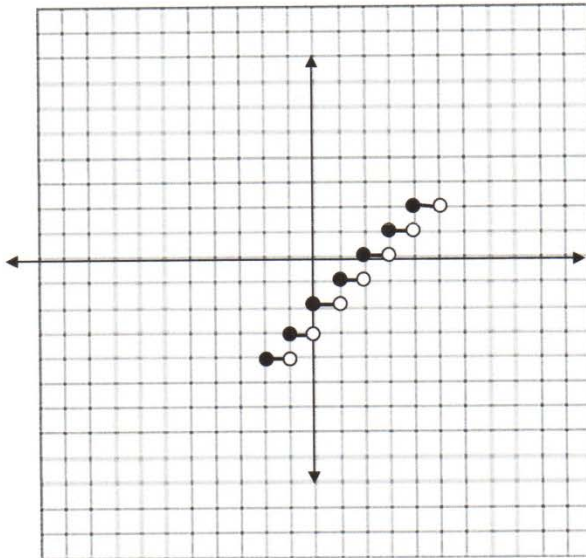
Assignment 2.6
Special Functions

Graph each function. Identify the domain and range.

$$f(x) = \lfloor x \rfloor - 2$$

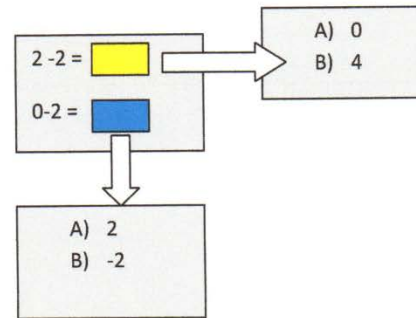
This is a "greatest integer function"

x	f(x)	
2		$\lfloor 2 \rfloor - 2 = 2 - 2 = 0$
1.1-1.9	-1	$\lfloor 1.5 \rfloor - 2 = 1 - 2 = -1$
1	-1	$\lfloor 1 \rfloor - 2 = 1 - 2 = -1$
0.1-0.9	-2	$\lfloor 0.5 \rfloor - 2 = 0 - 2 = -2$
0		$\lfloor 0 \rfloor - 2 = 0 - 2 = -2$



Domain: $\{x \mid x = \text{All Real \#s}\}$

Range: $\{f(x) \mid f(x) = \text{All Integers}\}$



Is this graph correct?

Yes

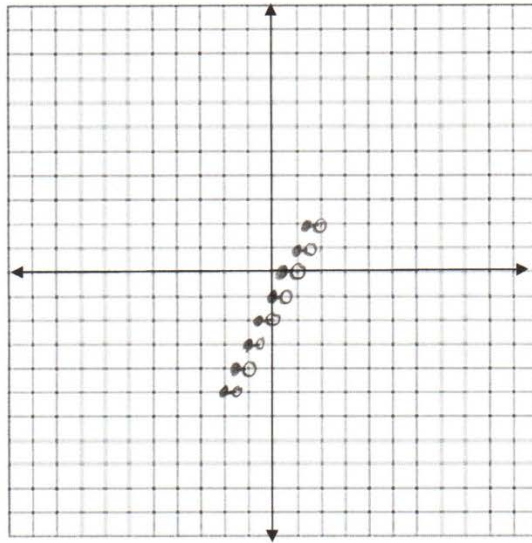
No

Choice Strategy

Assignment 2.6
Special Functions

$$h(x) = \lfloor 2x - 1 \rfloor$$

x	h(x)	
-2		$\leftarrow \lfloor 2(-2) - 1 \rfloor = \lfloor -4 - 1 \rfloor = \lfloor -5 \rfloor = -5$
-1.8	-5	$\leftarrow \lfloor 2(-1.8) - 1 \rfloor = \lfloor -3.6 - 1 \rfloor = \lfloor -4.6 \rfloor = -5$
-1.5		$\leftarrow \lfloor 2(-1.5) - 1 \rfloor = \lfloor -3 - 1 \rfloor = \lfloor -4 \rfloor = -4$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{h(x) \mid h(x) \in \mathbb{Z}\}$

A) -5
B) 5

-4 - 1 =
-3 - 1 =

A) -4
B) 4

Is this graph correct?

Yes

No

Choice Strategy

Assignment 2.6
Special Functions

$$g(x) = |x| + 4$$

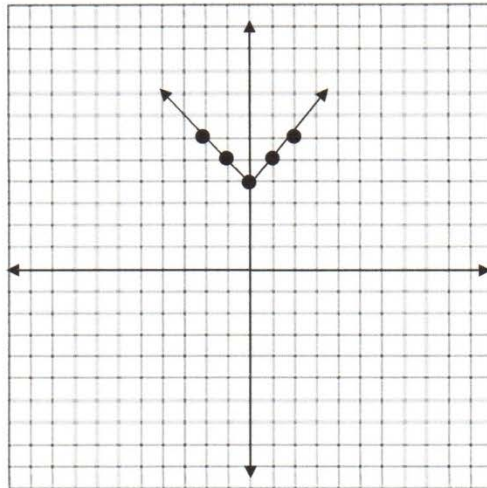
x	g(x)	
-2		← $ -2 + 4 = 2 + 4 = 6$
-1	5	← $ -1 + 4 = 1 + 4 = 5$
0	4	← $ 0 + 4 = 0 + 4 = 4$
1	5	← $ 1 + 4 = 1 + 4 = 5$
2		← $ 2 + 4 = 2 + 4 = 6$

$2 + 6 =$
 $2 + 4 =$

→

A) 8
B) 12

A) 8
B) 6



Is this graph correct?

Yes

No

Domain: $\{x | x \in \mathbb{R}\}$

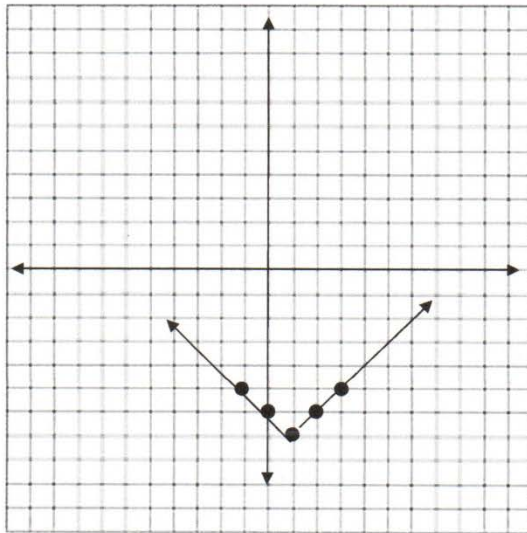
Range: $\{g(x) | g(x) \geq 4\}$

Choice Strategy

Assignment 2.6
Special Functions

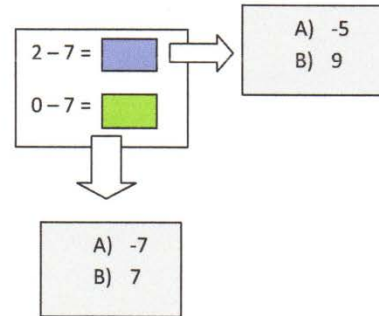
$$h(x) = |x - 1| - 7$$

x	h(x)	
-1		← $ -1-1 - 7 = -2 - 7 = 2 - 7 = -5$
0	-6	← $ 0-1 - 7 = -1 - 7 = 1 - 7 = -6$
1		← $ 1-1 - 7 = 0 - 7 = 0 - 7 = -7$
2	-6	← $ 2-1 - 7 = 1 - 7 = 1 - 7 = -6$



Domain $\{x | x \in \mathbb{R}\}$

Range: $\{h(x) | h(x) \geq -7\}$



Is this graph correct?

Yes

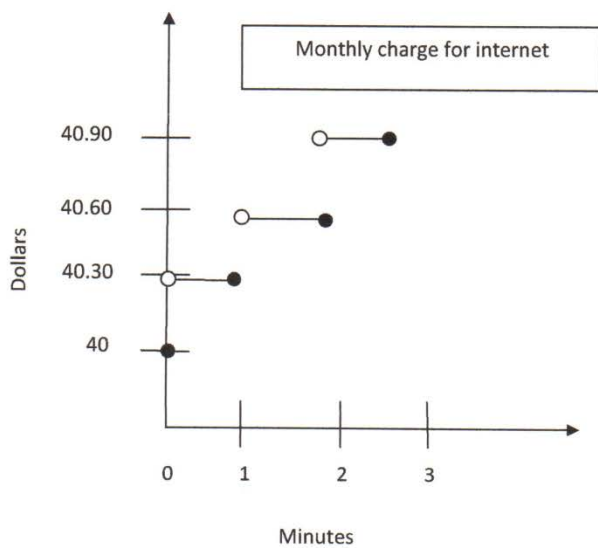
No

Choice Strategy

Assignment 2.6
Special Functions

WIRELESS INTERNET

A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.



Is this graph correct?

Yes

No

Choice Strategy

Assignment 2.6
Special Functions

Graph each function. Identify the domain and range.

$$f(x) = \llbracket x \rrbracket - 2$$

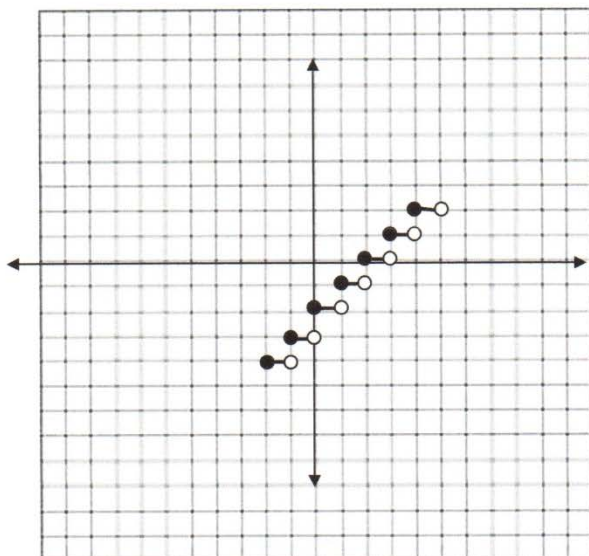
This is a "greatest integer function"

x	f(x)	
2		$\llbracket 2 \rrbracket - 2 = 2 - 2 = 0$
1.1-1.9	-1	$\llbracket 1.5 \rrbracket - 2 = 1 - 2 = -1$
1		$\llbracket 1 \rrbracket - 2 = 1 - 2 = -1$
0.1-0.9	-2	$\llbracket 0.5 \rrbracket - 2 = 0 - 2 = -2$
0		$\llbracket 0 \rrbracket - 2 = 0 - 2 = -2$

$$2-2 =$$

$$1-2 =$$

$$0-2 =$$



Domain: $\{x \mid x = \text{All Real \#}'s\}$

Range: $\{f(x) \mid f(x) = \text{All Integers}\}$

Closed Strategy

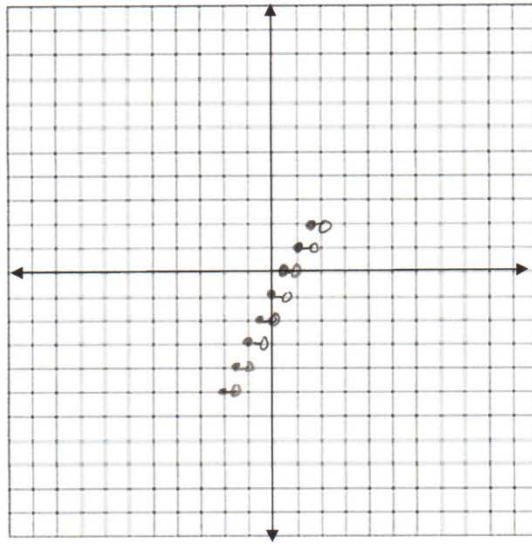
Assignment 2.6
Special Functions

$$h(x) = \llbracket 2x - 1 \rrbracket$$

x	h(x)	
-2		$\leftarrow \llbracket 2(-2) - 1 \rrbracket = \llbracket -4 - 1 \rrbracket = \llbracket -5 \rrbracket = -5$
-1.8	-5	$\leftarrow \llbracket 2(-1.8) - 1 \rrbracket = \llbracket -3.6 - 1 \rrbracket = \llbracket -4.6 \rrbracket = -5$
-1.5		$\leftarrow \llbracket 2(-1.5) - 1 \rrbracket = \llbracket -3 - 1 \rrbracket = \llbracket -4 \rrbracket = -4$

$-4 - 1 =$

$-3 - 1 =$

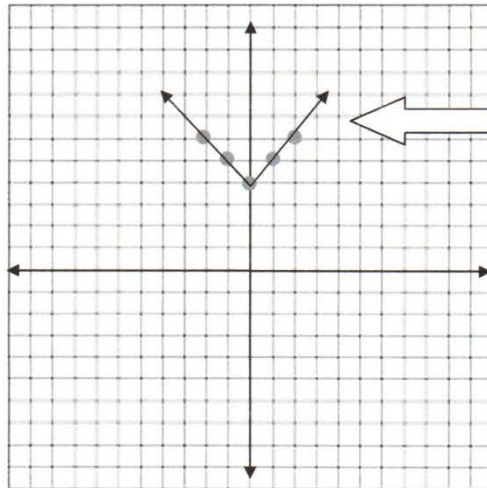


Assignment 2.6
Special Functions

$$g(x) = |x| + 4$$

x	g(x)	
-2		← $ -2 + 4 = 2 + 4 = 6$
-1	5	← $ -1 + 4 = 1 + 4 = 5$
0		← $ 0 + 4 = 0 + 4 = 4$
1	5	← $ 1 + 4 = 1 + 4 = 5$
2		← $ 2 + 4 = 2 + 4 = 6$

2 + 6 =	
0 + 4 =	
2 + 4 =	



Color the gray dots black.

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{g(x) \mid g(x) \geq 4\}$

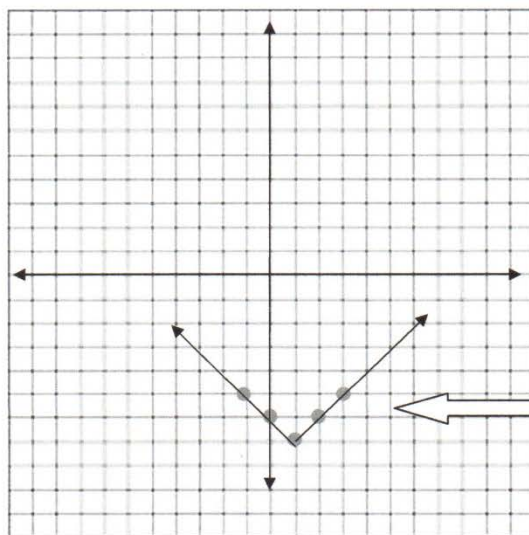
Closed Strategy

Assignment 2.6
Special Functions

$$h(x) = |x - 1| - 7$$

x	h(x)	
-1		← $ -1-1 - 7 = -2 - 7 = 2 - 7 = -5$
0		← $ 0-1 - 7 = -1 - 7 = 1 - 7 = -6$
1		← $ 1-1 - 7 = 0 - 7 = 0 - 7 = -7$
2	-6	← $ 2-1 - 7 = 1 - 7 = 1 - 7 = -6$

$2 - 7 =$	
$1 - 7 =$	
$0 - 7 =$	



Color the gray dots black.

Domain $\{x \mid x \in \mathbb{R}\}$

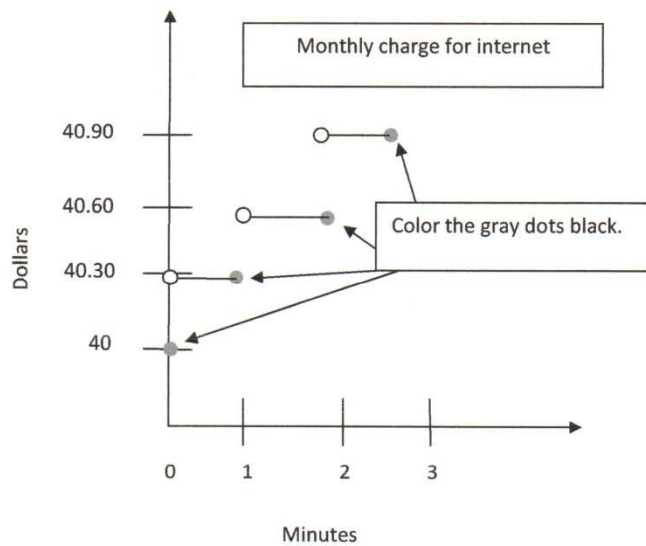
Range: $\{h(x) \mid h(x) \geq -7\}$

Closed Strategy

Assignment 2.6
Special Functions

WIRELESS INTERNET

A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.



Closed Strategy

Assignment 2.6
Special Functions

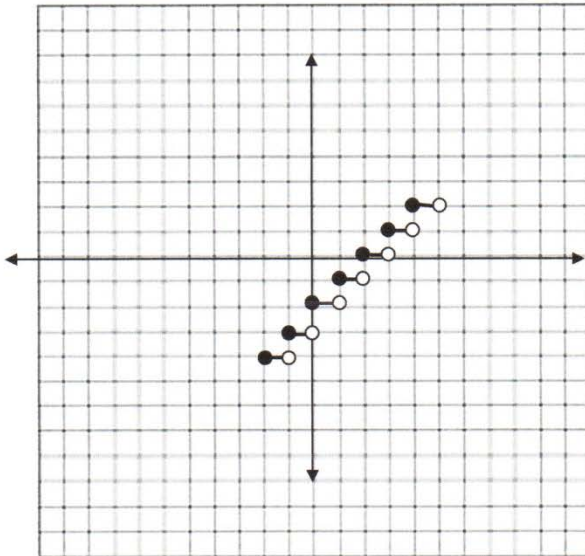
Graph each function. Identify the domain and range.

$$f(x) = \llbracket x \rrbracket - 2$$

This is a "greatest integer function"

x	f(x)	
2	0	$\llbracket 2 \rrbracket - 2 = 2 - 2 = 0$
1.1-1.9	-1	$\llbracket 1.5 \rrbracket - 2 = 1 - 2 = -1$
1	-1	$\llbracket 1 \rrbracket - 2 = 1 - 2 = -1$
0.1-0.9	-2	$\llbracket 0.5 \rrbracket - 2 = 0 - 2 = -2$
0		$\llbracket 0 \rrbracket - 2 = 0 - 2 = -2$

$$0 - 2 = \boxed{}$$



Domain: $\{x \mid x = \text{All Real \#}'s\}$

Range: $\{f(x) \mid f(x) = \text{All Integers}\}$

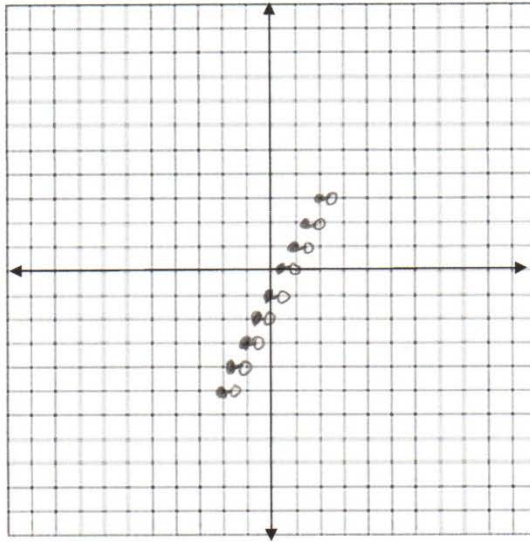
Closed Last Step Strategy

Assignment 2.6
Special Functions

$$h(x) = \lfloor 2x - 1 \rfloor$$

x	h(x)	
-2	-5	← $\lfloor 2(-2) - 1 \rfloor = \lfloor -4 - 1 \rfloor = \lfloor -5 \rfloor = -5$
-1.8	-5	← $\lfloor 2(-1.8) - 1 \rfloor = \lfloor -3.6 - 1 \rfloor = \lfloor -4.6 \rfloor = -5$
-1.5		← $\lfloor 2(-1.5) - 1 \rfloor = \lfloor -3 - 1 \rfloor = \lfloor -4 \rfloor = -4$

$$-3 - 1 = \boxed{}$$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{h(x) \mid h(x) \in \mathbb{Z}\}$

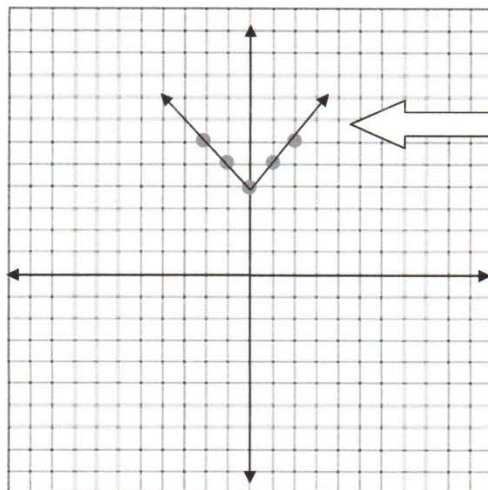
Closed Last Step Strategy

Assignment 2.6
Special Functions

$$g(x) = |x| + 4$$

x	g(x)	
-2	6	← $ -2 + 4 = 2 + 4 = 6$
-1	5	← $ -1 + 4 = 1 + 4 = 5$
0	4	← $ 0 + 4 = 0 + 4 = 4$
1	5	← $ 1 + 4 = 1 + 4 = 5$
2		← $ 2 + 4 = 2 + 4 = 6$

$$2 + 4 =$$



Color the gray dots black.

Domain: $\{x | x \in \mathbb{R}\}$

Range: $\{g(x) | g(x) \geq 4\}$

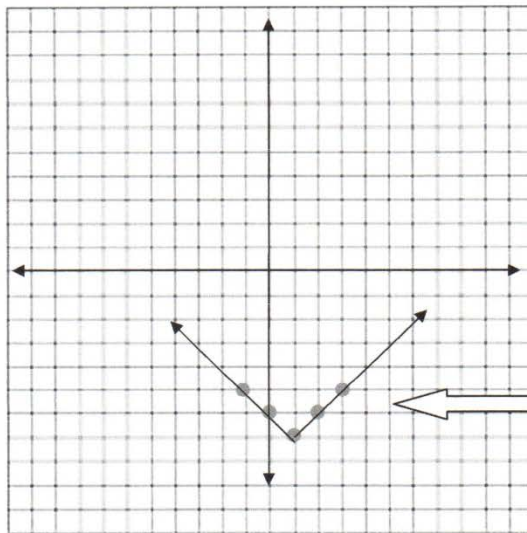
Closed Last Step Strategy

Assignment 2.6
Special Functions

$$h(x) = |x - 1| - 7$$

x	h(x)	
-1	-5	← $ -1-1 - 7 = -2 - 7 = 2 - 7 = -5$
0	-7	← $ 0-1 - 7 = -1 - 7 = 1 - 7 = -6$
1		← $ 1-1 - 7 = 0 - 7 = 0 - 7 = -7$
2	-6	← $ 2-1 - 7 = 1 - 7 = 1 - 7 = -6$

$$0 - 7 = \boxed{}$$



Color the gray dots black.

Domain $\{x | x \in \mathbb{R}\}$

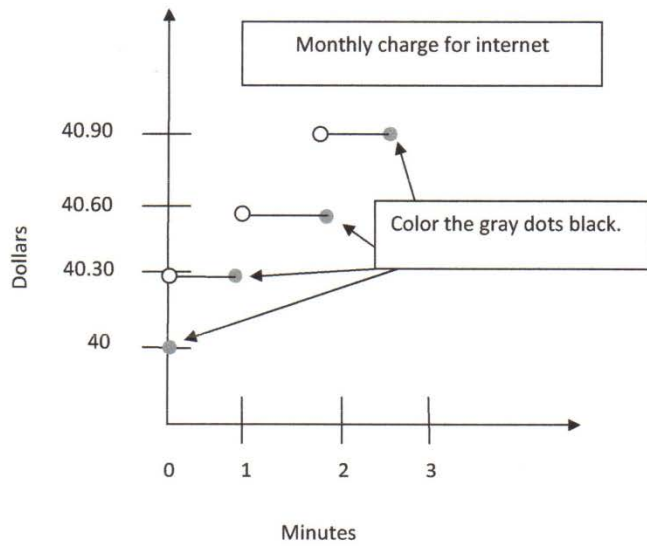
Range: $\{h(x) | h(x) \geq -7\}$

Closed Last Step Strategy

Assignment 2.6
Special Functions

WIRELESS INTERNET

A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.



Closed Last Step Strategy

Assignment 2.6
Special Functions

Graph each function. Identify the domain and range.

$$f(x) = \llbracket x \rrbracket - 2$$

$$h(x) = \llbracket 2x - 1 \rrbracket$$

$$g(x) = |x| + 4$$

$$h(x) = |x - 1| - 7$$

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

$$g(x) = \begin{cases} -2x - 3 & \text{if } x < 1 \\ x - 4 & \text{if } x > 1 \end{cases}$$

WIRELESS INTERNET

A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.

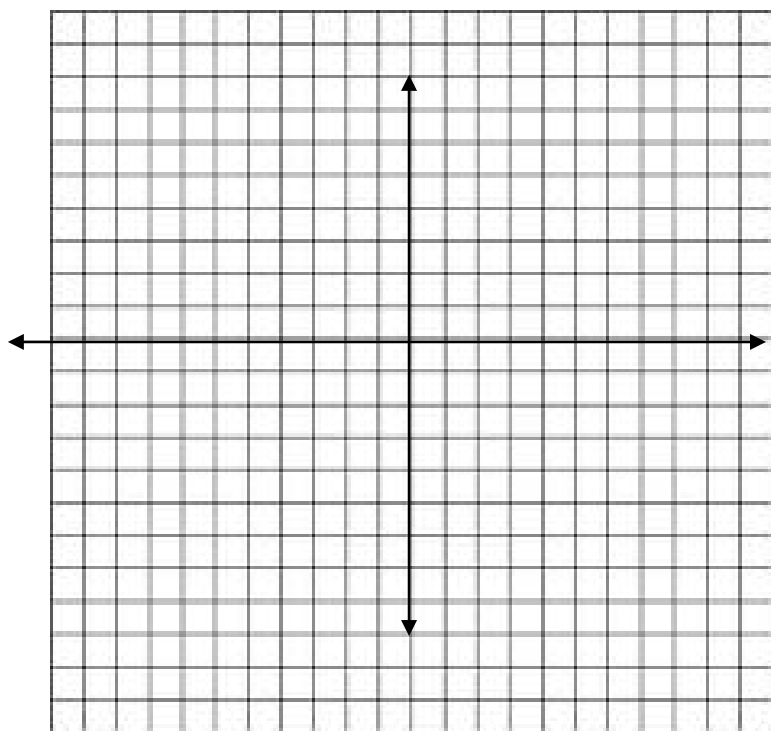
Assignment 2.6
Special Functions

Graph each function. Identify the domain and range.

$$f(x) = \llbracket x \rrbracket - 2$$

This is a “greatest integer function”

x	f(x)



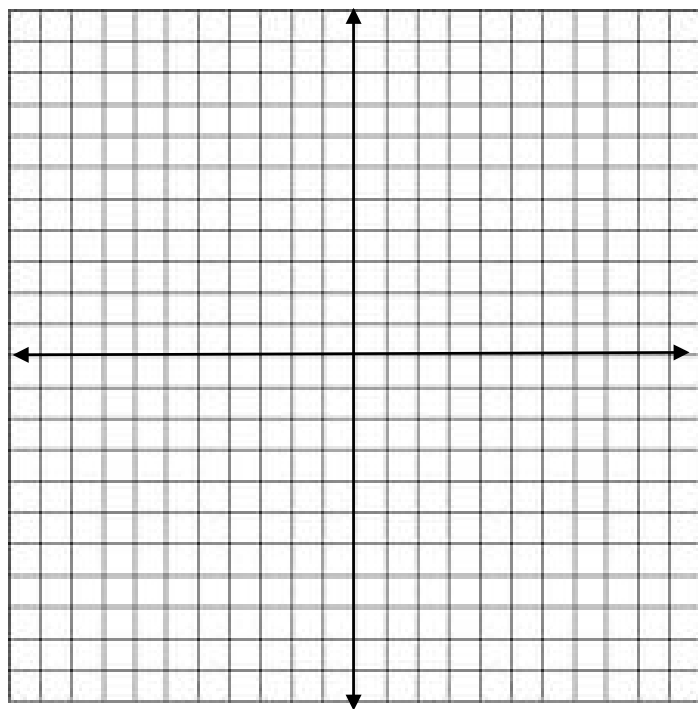
Domain:

Range:

Assignment 2.6
Special Functions

$$h(x) = \llbracket 2x - 1 \rrbracket$$

x	h(x)



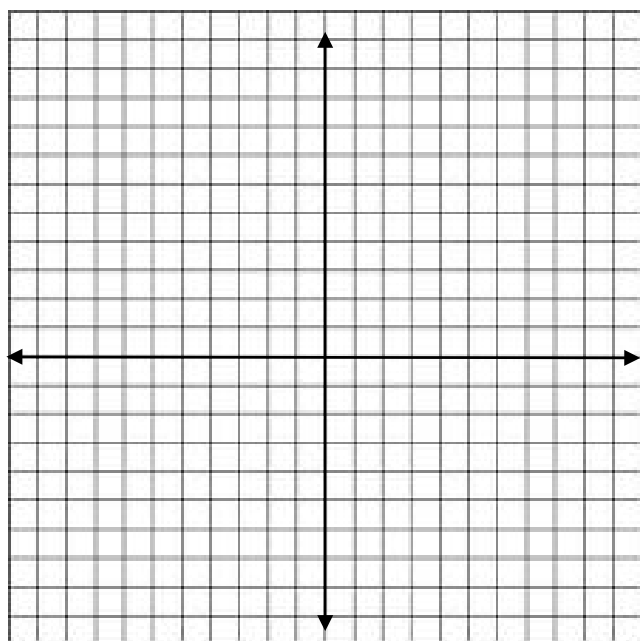
Domain:

Range:

Assignment 2.6
Special Functions

$$g(x) = |x| + 4$$

x	g(x)



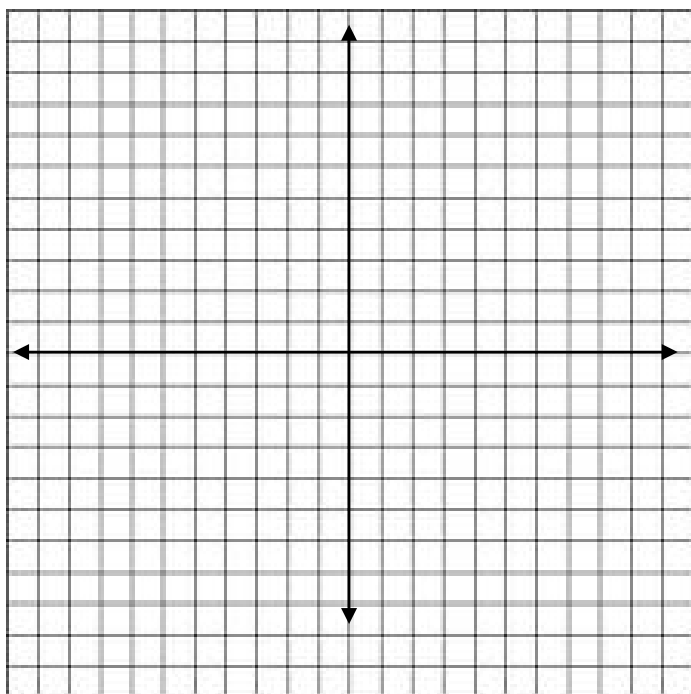
Domain:

Range:

Assignment 2.6
Special Functions

$$h(x) = |x - 1| - 7$$

x	h(x)



Domain:

Range:

Assignment 2.6
Special Functions

WIRELESS INTERNET

A wireless Internet provider charges \$40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.

