

# Station #1: Piecewise Functions

**Directions:** Graph each of the following. Then, state the boundary lines, the domain and range, and whether or not the graph is continuous or discontinuous.

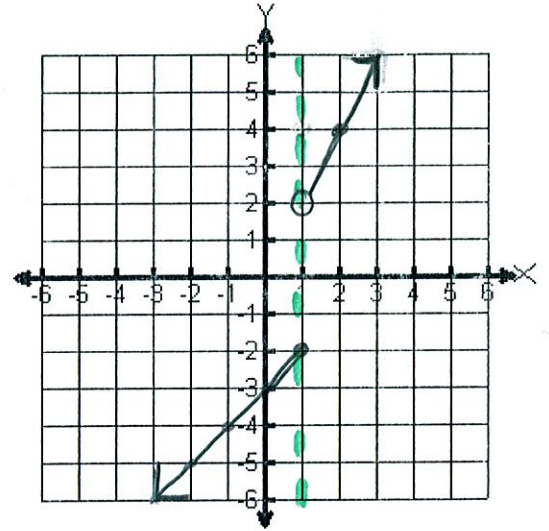
1.  $f(x) = \begin{cases} x-3, & x \leq 1 \\ 2x, & x > 1 \end{cases}$

$D_f = (-\infty, \infty)$   
 $R_f = (-\infty, -2] \cup (2, \infty)$

Continuous or discontinuous?

Evaluate the function at each of the following:

$f(0) = -3$        $0-3 = -3$   
 $f(1) = -2$        $1-3 = -2$   
 $f(2) = 4$        $2(2) = 4$



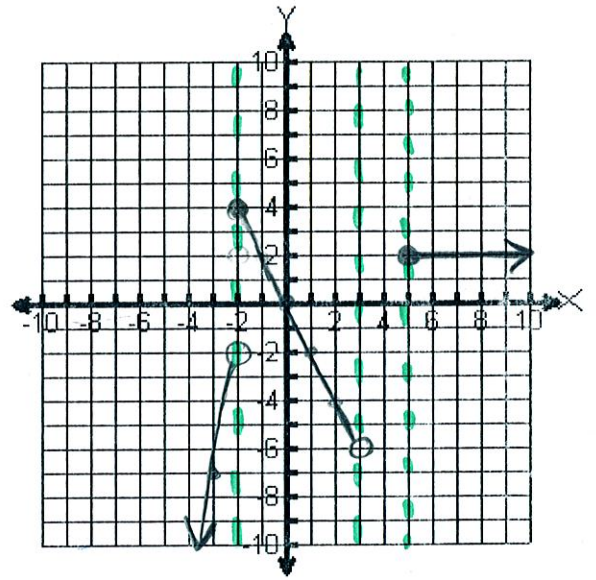
2.  $f(x) = \begin{cases} 2, & x \geq 5 \\ -2x, & -2 \leq x < 3 \\ 2-x^2, & x < -2 \end{cases}$

$D_f = (-\infty, 3) \cup [5, \infty)$   
 $R_f = (-\infty, 4]$

Continuous or discontinuous?

Evaluate the function at each of the following:

$f(-2) = 4$        $-2(-2) = 4$   
 $f(5) = 2$



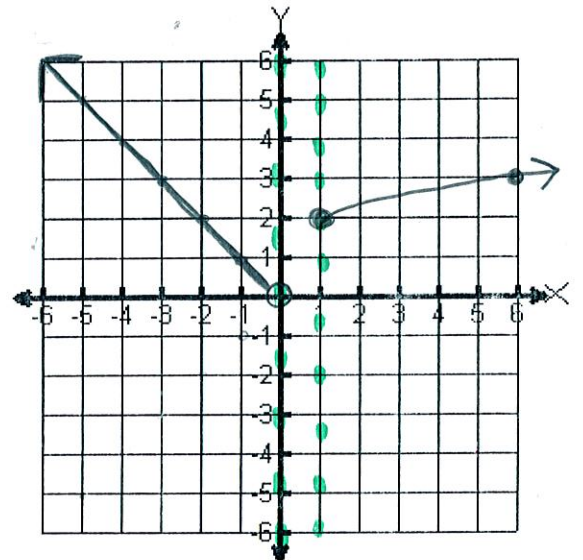
3.  $f(x) = \begin{cases} \sqrt{x+3}, & x \geq 1 \\ -x, & x < 0 \end{cases}$

$D_f = (-\infty, 0) \cup [1, \infty)$   
 $R_f = (0, \infty)$

Continuous or discontinuous?

Evaluate the function at each of the following:

$f(1) = 2$        $\sqrt{1+3} = \sqrt{4} = 2$   
 $f(6) = 3$        $\sqrt{6+3} = \sqrt{9} = 3$   
 $f(0) = \text{undefined}$



# Station #2: Parent Functions and Transformations

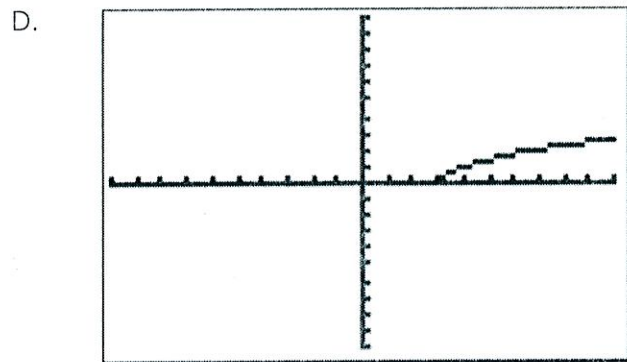
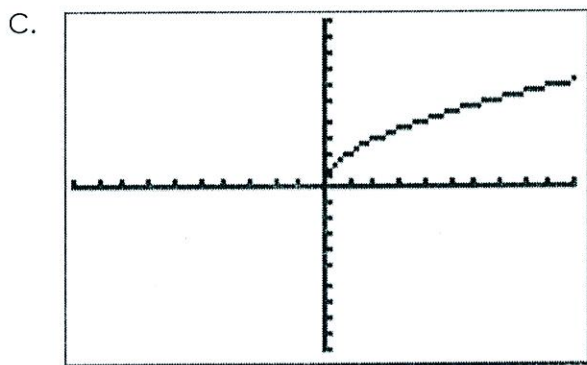
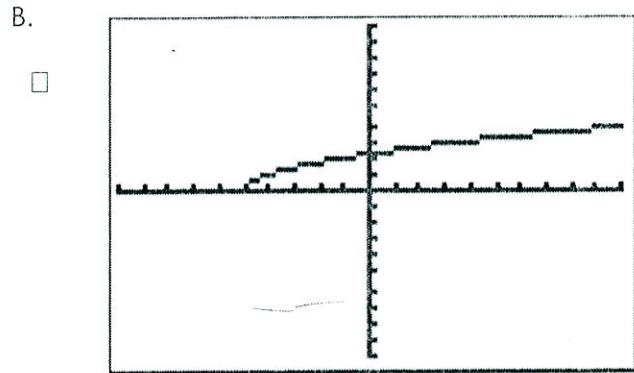
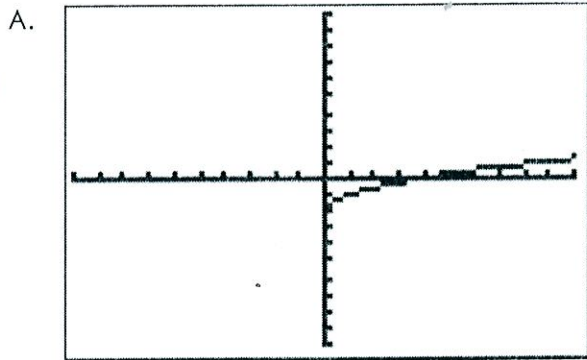
Directions. Match each equation with a given graph.

1.  $y = \sqrt{x+5}$  B

2.  $y = \sqrt{x}-2$  A

3.  $y = \sqrt{x-3}$  D

4.  $y = 2\sqrt{x}$  C



2. State the parent function and the given transformations of each of the following:

a.  $f(x) = -|x+3| + 2$

Absolute value, reflection, L3, U2

b.  $f(x) = 12(x-5)^2$

Quadratic, stretch 12, R5

c.  $f(x) = 1/3 \log x + 7$

Logarithmic, compress 1/3, up 7

d.  $f(x) = -4(2)^{x-1} - 6$

Exponential, reflect over x, stretch, R1, D6

e.  $f(x) = 0.5x^3 + 1$

Cubic, compress 0.5, up 1

3. Given the function  $f(x) = x^2$ , write the function whose graph of  $f(x)$  is:

a. shifted 6 units to the left

$y = (x+6)^2$

b. reflected about the x-axis

$y = -x^2$

c. shifted 5 units up

$y = x^2 + 5$

d. vertically stretched by a factor of 4

$y = 4x^2$

e. vertically compressed by a factor of 1/3

$y = \frac{1}{3}x^2$

# Station #3: Logarithmic and Exponential Functions

Directions: Find the inverse of each equation below.

1.  $y = 3x + 5$

2.  $y = -4x + 8$

3.  $y = \log_3(x-2)$

4.  $y = \log_2 x + 4$

5.  $y = \log_6(x+1) - 3$

1.  $x = 3y + 5$

$x - 5 = 3y$

$y = \frac{x-5}{3}$

2.  $x = -4y + 8$

$x - 8 = -4y$

$y = \frac{x-8}{-4}$

$y = -\frac{x+8}{4}$

3.  $\log_3(y-2) = x$

$3^x = y - 2$

$y = 3^x + 2$

4.  $\log_2 y + 4 = x$

$\log_2 y = x - 4$

$2^{x-4} = y$

$y = 2^{x-4}$

Directions: Graph each of the following. State the domain, range, asymptotes, and transformations from the parent function.

6.  $f(x) = \frac{1}{4}(2)^{x-1} - 7$

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

Range:  $(-7, \infty)$

Asymptote:  $k = -7$

Transformations: compress, R1, D7

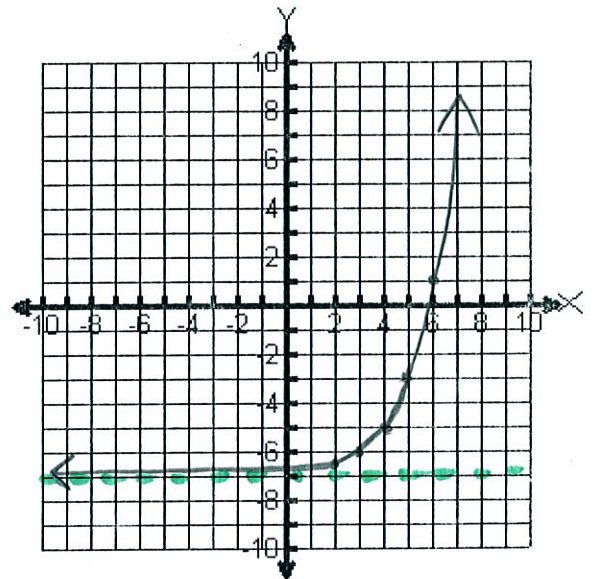
#5.  $\log_6(y+1) - 3 = x$

$\log_6(y+1) = x + 3$

$6^{x+3} = y + 1$

$y = 6^{x+3} - 1$

x	2	3	4	5	6
y	-6.5	-6	-5	-3	1



7.  $f(x) = \log_5(x+1) + 4$

x	3	4	5	6	
y	-0.8	0	4	24	

x	-0.8	0	4	24	
y	3	4	5	6	

Domain:  $(-1, \infty)$

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

Asymptote:  $h = -1$

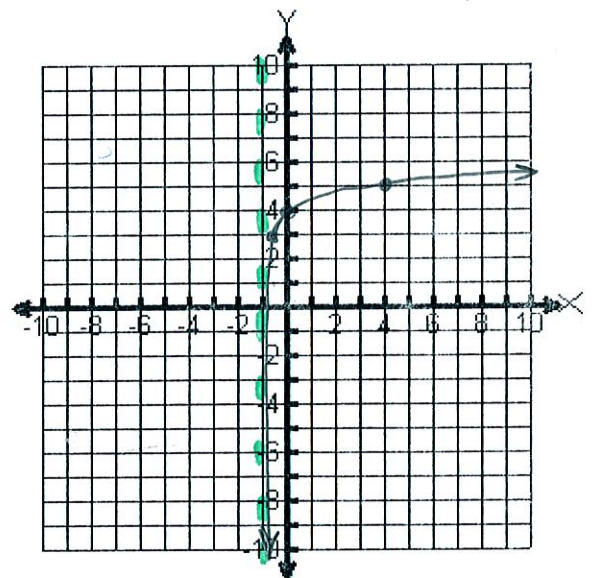
Transformations: L1, U4

$\log_5(y+1) + 4 = x$

$\log_5(y+1) = x - 4$

$5^{x-4} = y + 1$

$y = 5^{x-4} - 1$



# Station #4: Radical & Absolute Value Functions

Directions: Graph each of the following. Then, state the domain and range and any transformations upon the parent function.

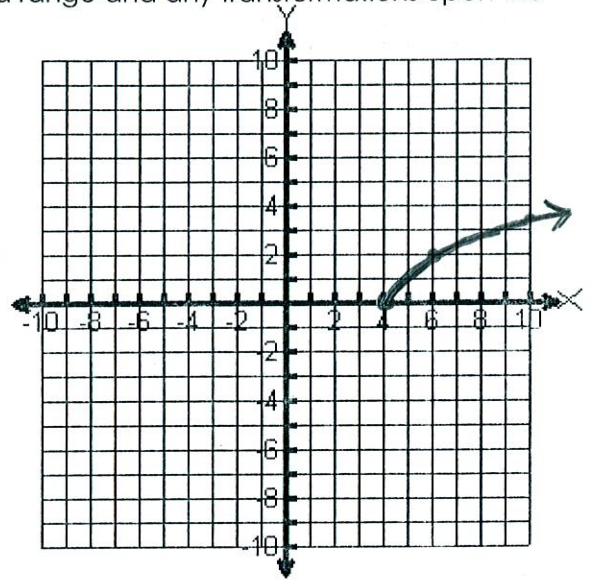
1.  $b(n) = \sqrt{2n-8}$

Domain:  $[4, \infty)$

Range:  $[0, \infty)$

Transformations:  $R4$

X	4	6	10		
Y	0	2	3.46		



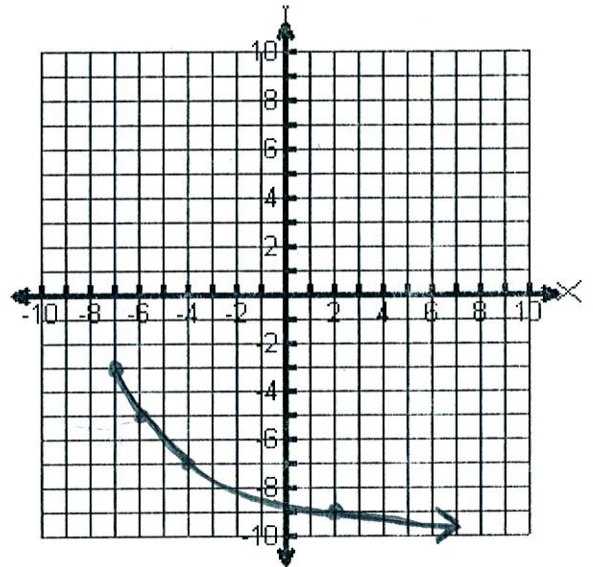
2.  $m(t) = -2\sqrt{x+7} - 3$

Domain:  $[-7, \infty)$

Range:  $(-\infty, -3]$

Transformations: Reflection, stretch, L7, D3

X	-7	-6	-3	2	9
Y	-3	-5	-7	-9	-11



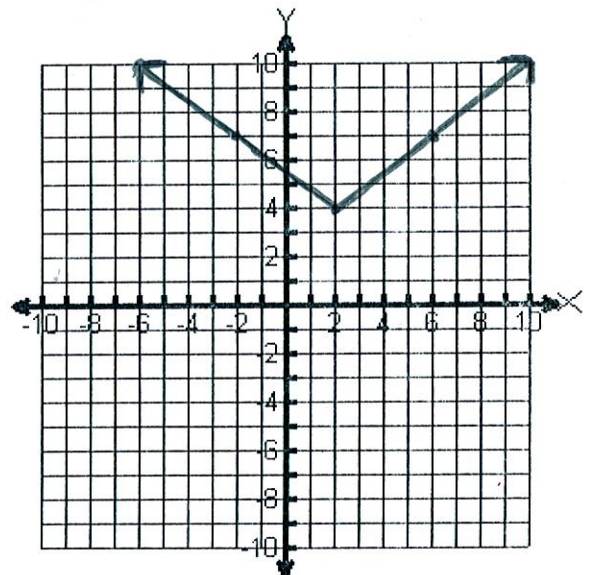
3.  $m(t) = 4 + 0.75|x-2|$

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

Range:  $[4, \infty)$

Transformations: Compress, up 4, R2

X	-6	-2	2	6	10
Y	10	7	4	7	10



# Station #5: Composition of Functions

**Directions:** Let  $f(x) = 2x - 1$ ,  $g(x) = 3x$ , and  $h(x) = x^2 + 1$ . Compute the following:

1.  $f(g(-3))$

$$g(-3) = 3(-3) = -9$$

$$\begin{aligned} f(-9) &= 2(-9) - 1 \\ &= -18 - 1 \\ &= -19 \end{aligned}$$

$$f(g(-3)) = -19$$

2.  $f(h(7))$

$$h(7) = (7)^2 + 1 = 50$$

$$\begin{aligned} f(50) &= 2(50) - 1 \\ &= 100 - 1 \\ &= 99 \end{aligned}$$

$$f(h(7)) = 99$$

3.  $(g \circ h)(24) = g(h(24))$

$$\begin{aligned} h(24) &= (24)^2 + 1 \\ &= 577 \end{aligned}$$

$$\begin{aligned} g(577) &= 3(577) \\ &= 1731 \end{aligned}$$

$$(g \circ h)(24) = 1731$$

4.  $f(g(h(2)))$

$$h(2) = (2)^2 + 1 = 5$$

$$g(5) = 3(5) = 15$$

$$f(15) = 2(15) - 1 = 29$$

$$f(g(h(2))) = 29$$

5.  $h(g(f(5)))$

$$f(5) = 2(5) - 1 = 9$$

$$g(9) = 3(9) = 27$$

$$\begin{aligned} h(27) &= (27)^2 + 1 \\ &= 730 \end{aligned}$$

$$h(g(f(5))) = 730$$

6.  $g(f(h(-6)))$

$$h(-6) = (-6)^2 + 1 = 37$$

$$f(37) = 2(37) - 1 = 73$$

$$g(73) = 3(73) = 219$$

$$g(f(h(-6))) = 219$$

**Directions:** Let  $f(x) = -3x + 7$  and  $g(x) = 2x^2 - 8$ . Compute the following:

7.  $f(g(x))$

$$f(2x^2 - 8)$$

$$-3(2x^2 - 8) + 7$$

$$-6x^2 + 18x + 7$$

$$f(g(x)) = -6x^2 + 18x + 7$$

8.  $(g \circ f)(x) = g(f(x))$

$$g(-3x + 7)$$

$$2(-3x + 7)^2 - 8$$

$$2(-3x + 7)(-3x + 7) - 8$$

$$(-6x + 14)(-3x + 7) - 8$$

$$18x^2 - 42x - 42x + 98 - 8$$

$$18x^2 - 84x + 90$$

$$g(f(x)) = 18x^2 - 84x + 90$$

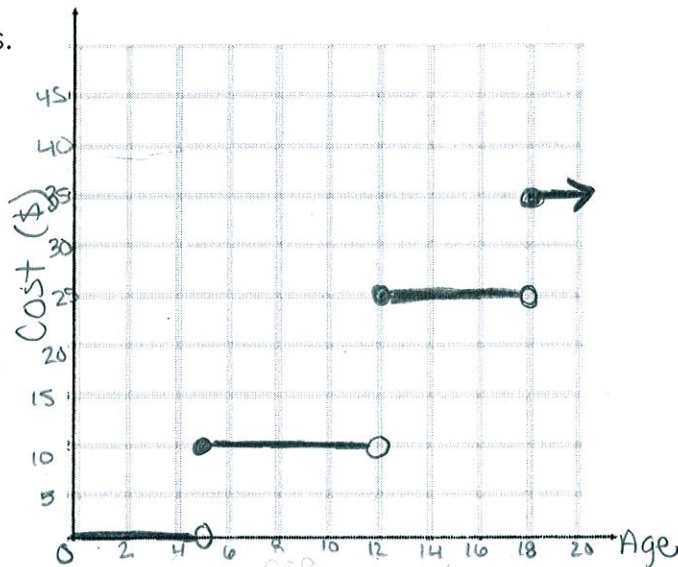
# Station #6: Step Functions

1. The admission rates at an amusement park are as follows.

- Children under 5 years old: free
- Children between 5 years and under 12 years: \$10.00
- Children between 12 years and under 18 years: \$25.00
- Adults: \$35.00

a. Graph the function.

b. How much would it cost for one 4 year old, two eight year olds, one 12 year old, and an adult to go to the park?

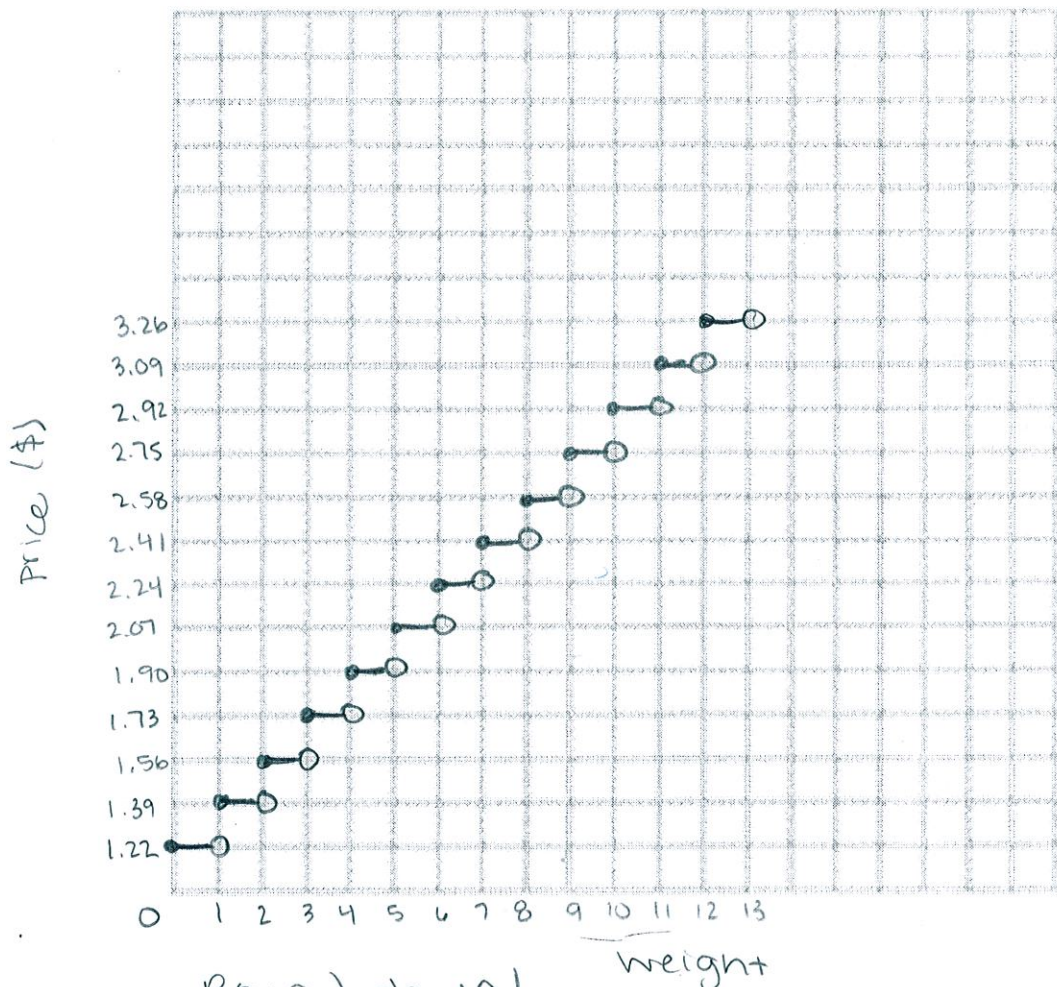


2. Here are first-class mail rates for packages from the US Postal Service's website. Graph the table below on the graph provided. Label each axis appropriately.

First-Class Package Rates

Weight Not Over	Price
1 ounce	\$1.22
2 ounces	\$1.39
3 ounces	\$1.56
4 ounces	\$1.73
5 ounces	\$1.90
6 ounces	\$2.07
7 ounces	\$2.24
8 ounces	\$2.41
9 ounces	\$2.58
10 ounces	\$2.75
11 ounces	\$2.92
12 ounces	\$3.09
13 ounces	\$3.26

Over 13 oz, see Priority Mail



3. Evaluate the following step functions.

a)  $\lfloor 3.8 \rfloor$

3

b)  $\lfloor -2.9 \rfloor$

-3

c)  $2 + \lfloor 4.1 \rfloor$

$2 + 4$   
 $= 6$

d)  $-4 \lfloor 6.89 \rfloor$

$-4(6)$   
 $= -24$

Round down!