

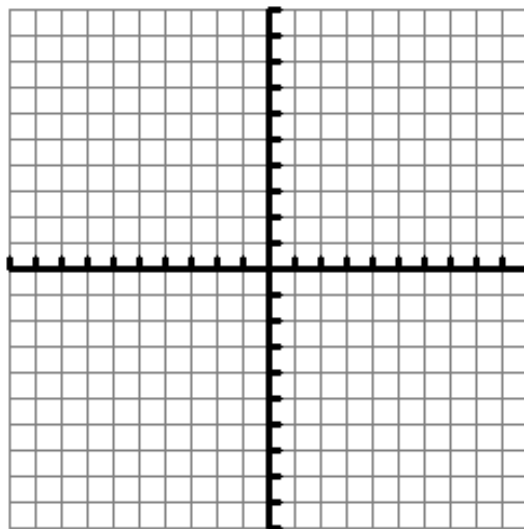
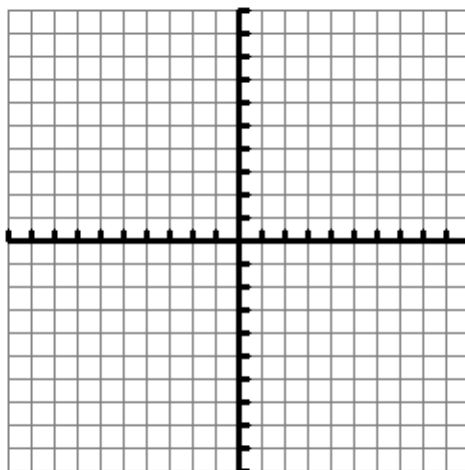
## Library of Functions (2.4)

① Constant Function:  $f(x)=b$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- CONSTANT on the interval: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_

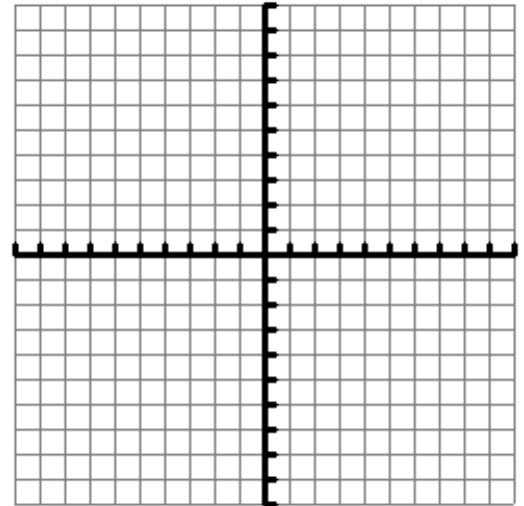
② Identity Function:  $f(x)=x$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- CONSTANT on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_



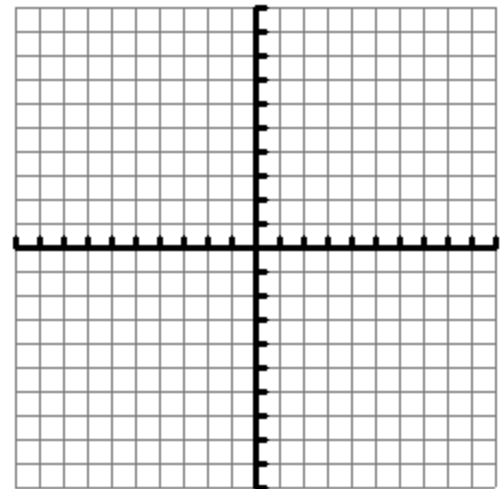
③ Square Function:  $f(x) = x^2$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- LOCAL MINIMUM: \_\_\_\_\_
- LOCAL MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- CONSTANT on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_



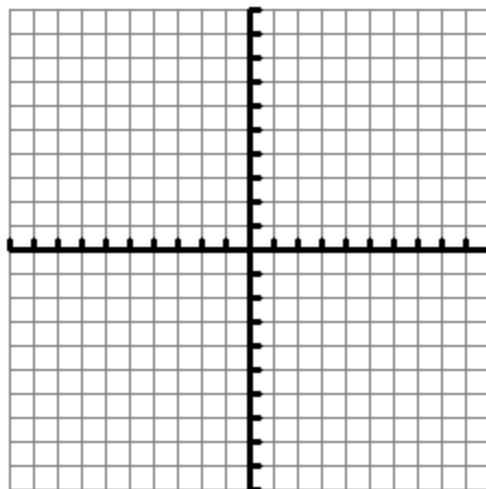
④ Cube Function:  $f(x) = x^3$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- LOCAL MINIMUM: \_\_\_\_\_
- LOCAL MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_



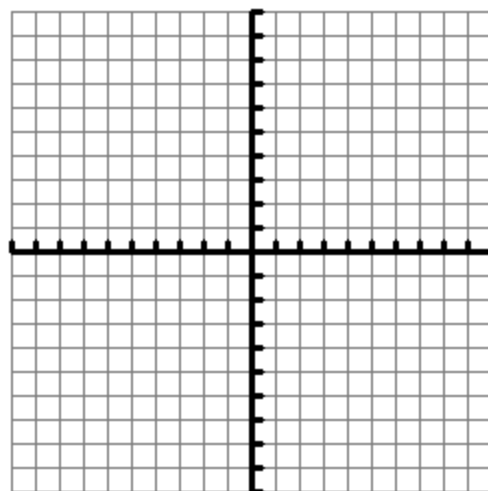
⑤ Square Root Function:  $f(x) = \sqrt{x}$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- MINIMUM: \_\_\_\_\_
- MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_



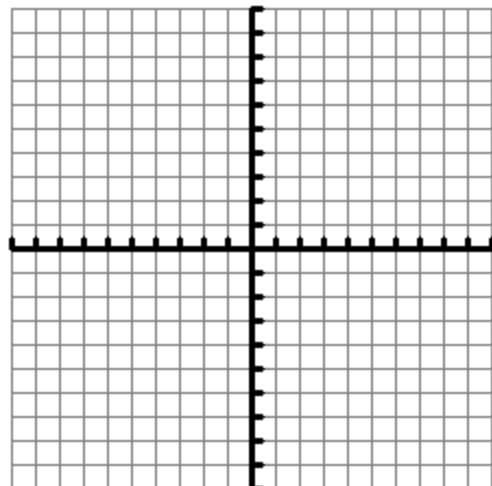
⑥ Cube Root Function:  $f(x) = \sqrt[3]{x}$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- LOCAL MINIMUM: \_\_\_\_\_
- LOCAL MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- $x$ -INTERCEPT(s): \_\_\_\_\_
- $y$ -INTERCEPT: \_\_\_\_\_



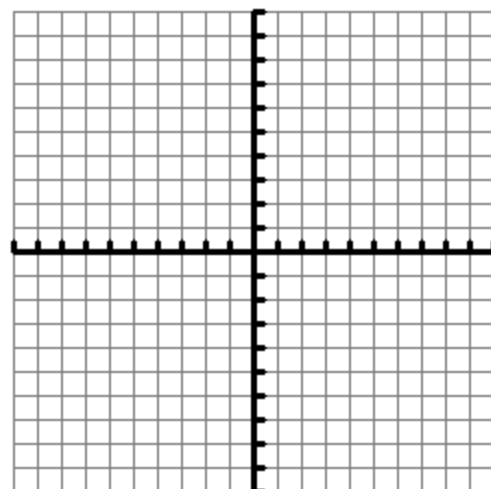
⑦ Reciprocal Function:  $f(x) = \frac{1}{x}$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- LOCAL MINIMUM: \_\_\_\_\_
- LOCAL MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- x-INTERCEPT(s): \_\_\_\_\_
- y-INTERCEPT: \_\_\_\_\_



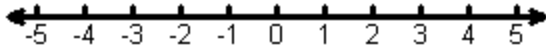
⑧ Absolute Value Function:  $f(x) = |x|$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- LOCAL MINIMUM: \_\_\_\_\_
- LOCAL MAXIMUM: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- CONSTANT on the interval: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- x-INTERCEPT(s): \_\_\_\_\_
- y-INTERCEPT: \_\_\_\_\_



⑨ Greatest Integer Function (Step Function):

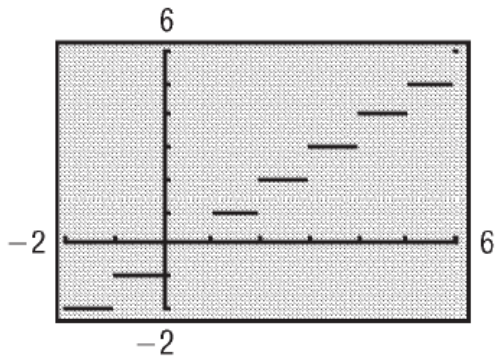
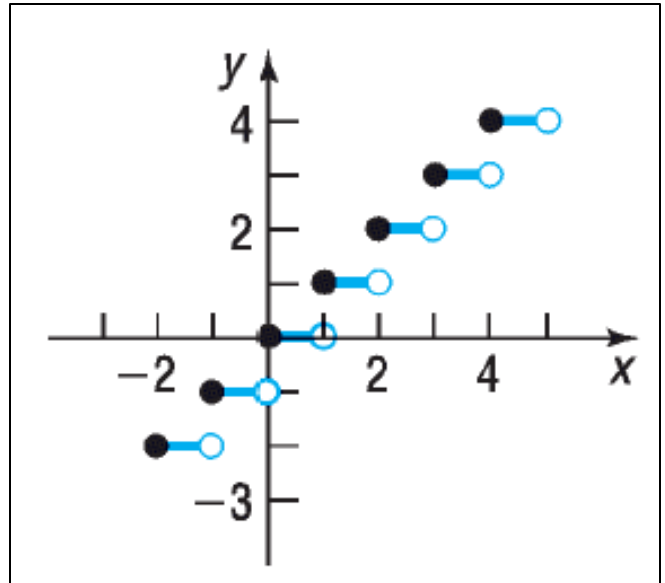
$f(x) = \text{int}(x) = [x]$  = the greatest integer less than or equal to  $x$ .



$f\left(\frac{1}{2}\right) = \underline{\hspace{2cm}}$        $f\left(-\frac{1}{2}\right) = \underline{\hspace{2cm}}$

$f(-3) = \underline{\hspace{2cm}}$        $f(2.5) = \underline{\hspace{2cm}}$

- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- Any SYMMETRIES observed: \_\_\_\_\_
- EVEN, ODD, or NEITHER: \_\_\_\_\_
- x-INTERCEPT(s): \_\_\_\_\_
- y-INTERCEPT: \_\_\_\_\_



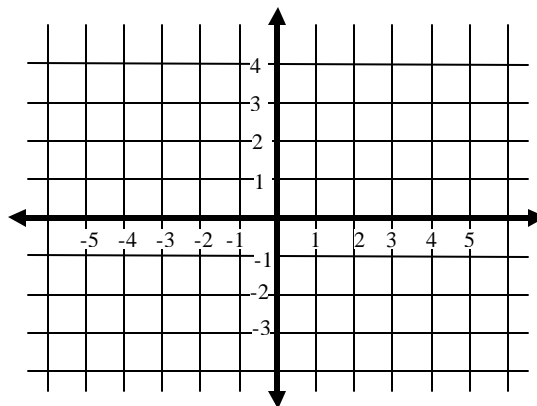
(b) Dot mode

⑩ Linear Function:  $f(x) = mx + b$

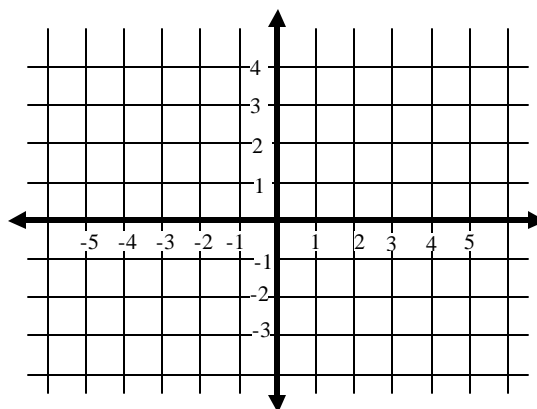
- DOMAIN: \_\_\_\_\_
- RANGE: \_\_\_\_\_
- INCREASING on the interval: \_\_\_\_\_
- DECREASING on the interval: \_\_\_\_\_
- y-INTERCEPT: \_\_\_\_\_

### Piecewise-Defined Functions (2.4)

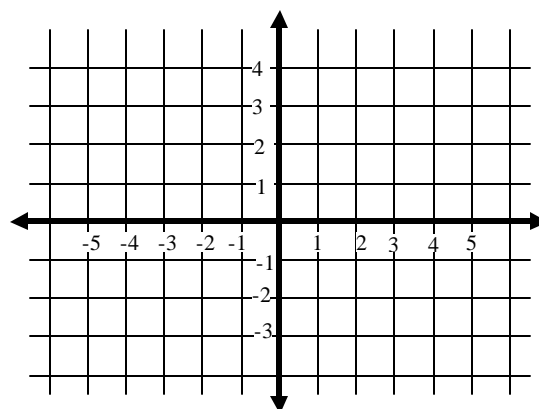
1.  $f(x) = |x| = \left\{ \right.$



2.  $g(x) = \begin{cases} 5x & \text{if } x \neq 2 \\ 0 & \text{if } x = 2 \end{cases}$



3.  $h(x) = \begin{cases} 2x+4 & x \leq 1 \\ 4 & 1 < x \leq 3 \\ -x & x > 3 \end{cases}$



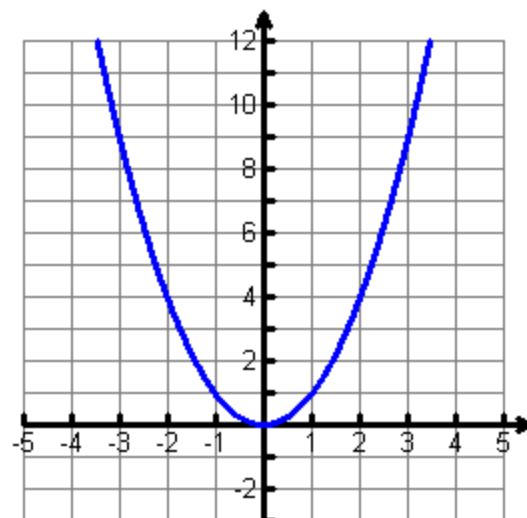
## Graphing Techniques: Transformations (2.5)

### Part 1: Vertical Shifts

Use a graphing utility to display the graphs of the transformations of the function  $f(x) = x^2$ .

- a)  $y_1 = x^2$
- b)  $y_2 = x^2 - 2$
- c)  $y_3 = x^2 + 4$

Use the results to describe the effect  $k$  has on the graph of  $f$ ; describe the transformation resulting from function  $y = f(x) \pm k$ .

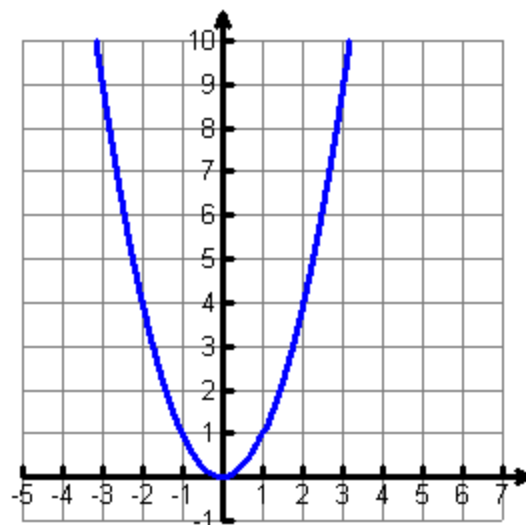


### Part 2: Horizontal Shifts

Use a graphing utility to display the graphs of the transformations of the function  $f(x) = x^2$ .

- d)  $y_1 = x^2$
- e)  $y_2 = (x - 3)^2$
- f)  $y_3 = (x + 2)^2$

Use the results to describe the effect  $c$  has on the graph of  $f$ ; describe the transformation resulting from function  $y = f(x \pm h)$ .

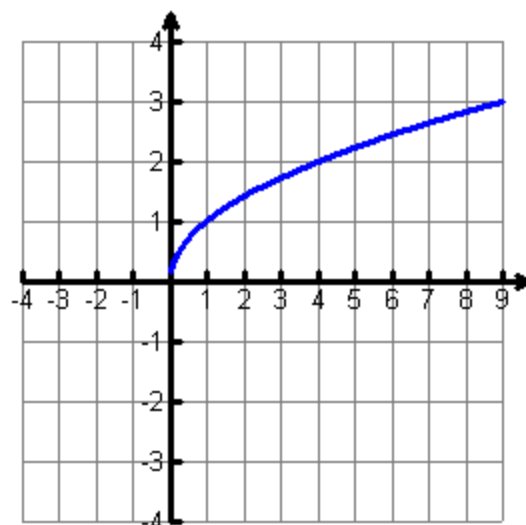


### Part 3: Reflections

Use a graphing utility to display the graphs of the transformations of the function  $f(x) = \sqrt{x}$ .

- g)  $y_1 = \sqrt{x}$
- h)  $y_2 = -\sqrt{x}$
- i)  $y_3 = \sqrt{-x}$

Use the results to describe the effects on the graph of  $f$ ; describe the transformation resulting from  $y = -f(x)$  and  $y = f(-x)$ .



#### Part 4: Vertical Stretches and Compressions

Use a graphing utility to display the graphs of the transformations of the function

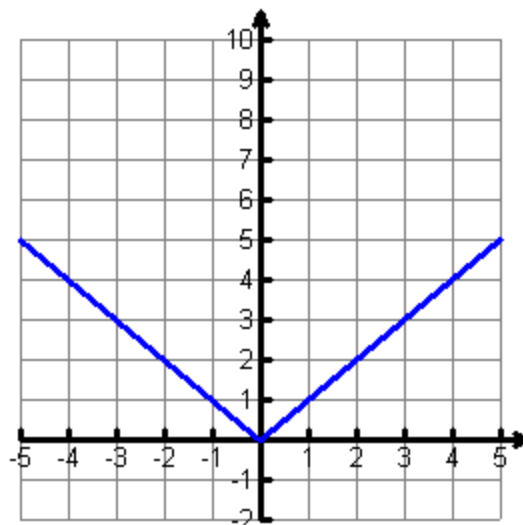
function  $f(x) = |x|$ .

j)  $y_1 = |x|$

k)  $y_2 = 3|x|$

l)  $y_3 = \frac{1}{3}|x|$

Use the results to describe the effect  $a$  has on the graph of  $f$ ; describe the transformation resulting from the function  $y = af(x)$ .



#### Part 5: Horizontal Stretches and Compressions

Use a graphing utility to display the graphs of the transformations of the function  $f(x) = \sqrt{1-x^2}$ .

m)  $y_1 = \sqrt{1-x^2}$

n)  $y_2 = \sqrt{1-(3x)^2}$

o)  $y_3 = \sqrt{1-(\frac{1}{3}x)^2}$

o)

Use the results to describe the effect  $a$  has on the graph of  $f$ ; describe the transformation resulting from  $y = f(ax)$ .

