

**FAR
BEYOND**

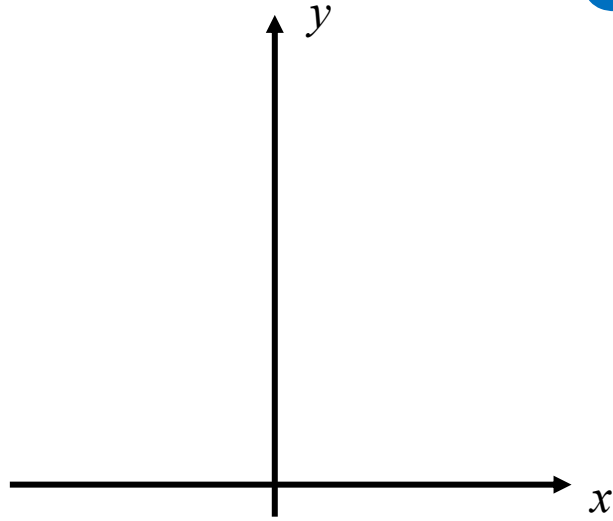
MAT122

Transformations

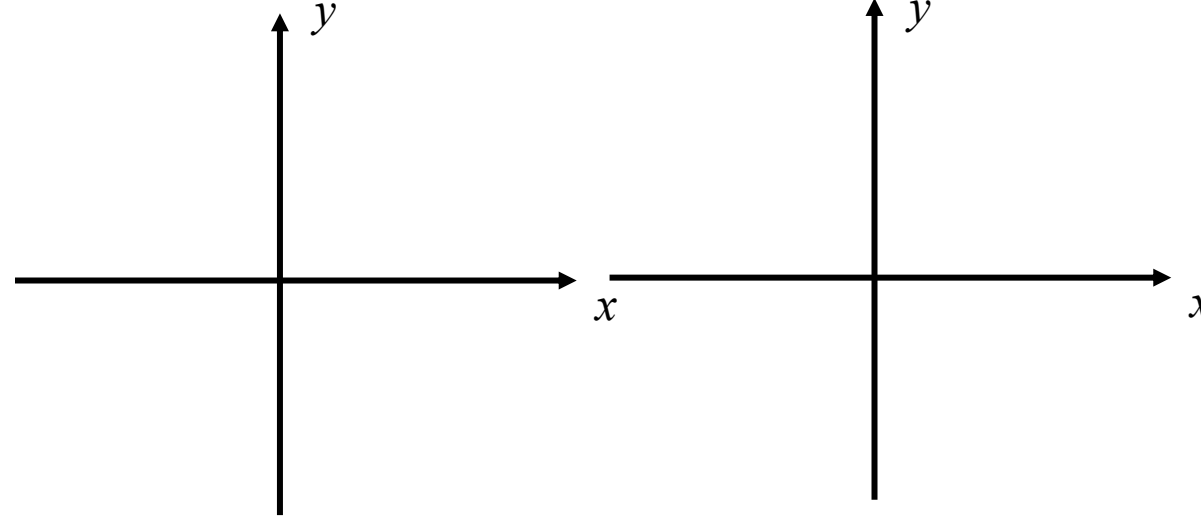


Stony Brook University

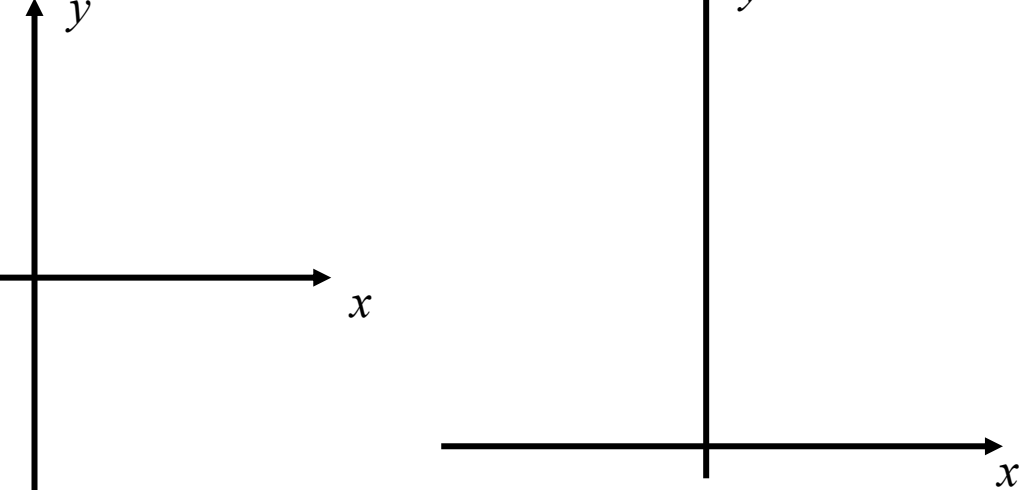
Common Graphs to Know



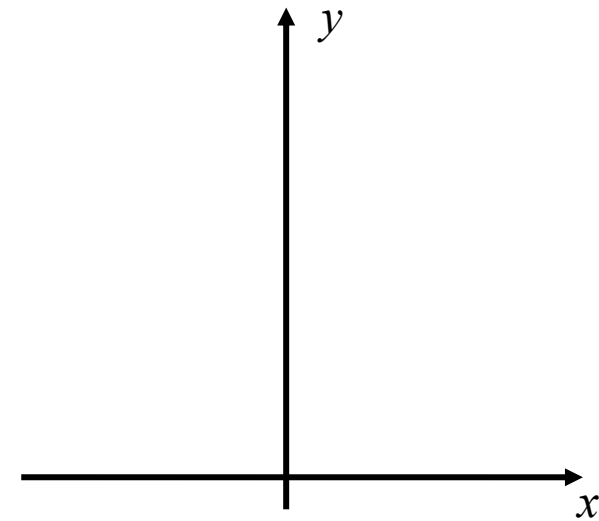
$$y = c \quad \text{domain: } \mathbb{R} \\ \text{range: } \{c\}$$



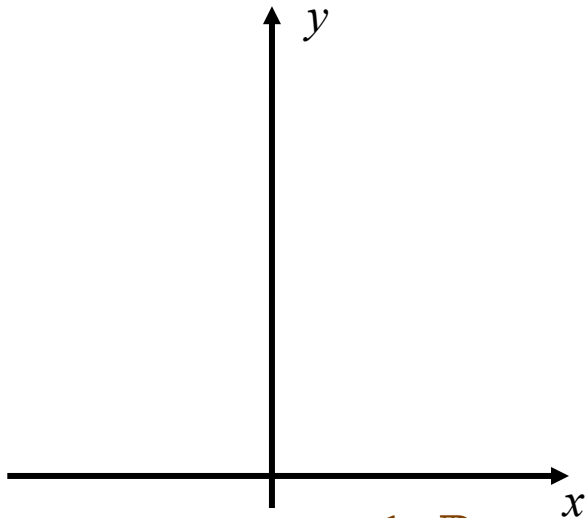
$$y = x \quad \text{d: } \mathbb{R} \\ \text{r: } \mathbb{R}$$



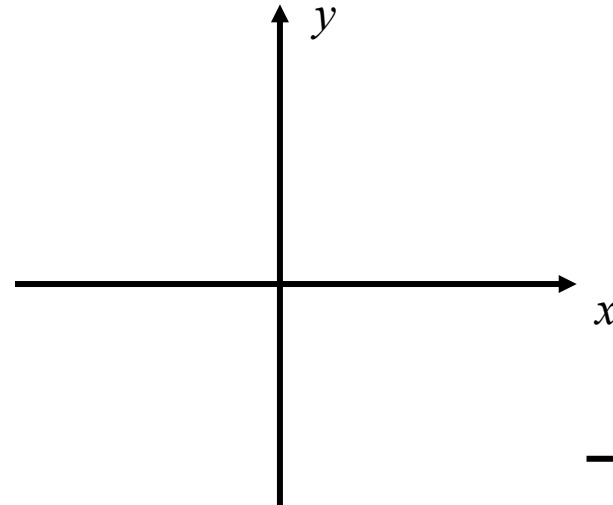
$$y = -x \quad \text{d: } \mathbb{R} \\ \text{r: } \mathbb{R}$$



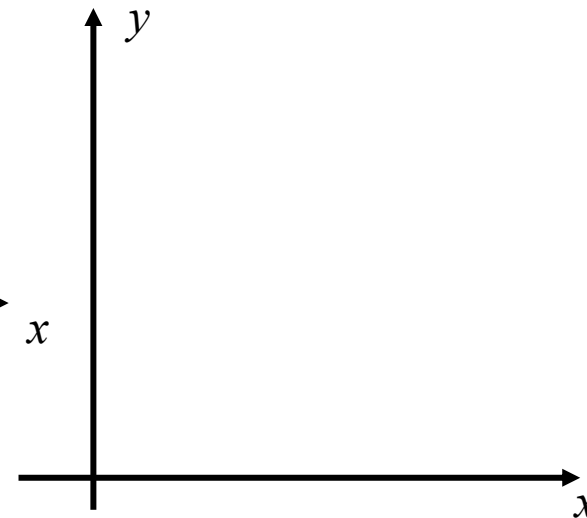
$$y = |x| \quad \text{d: } \mathbb{R} \\ \text{r: } [0, \infty)$$



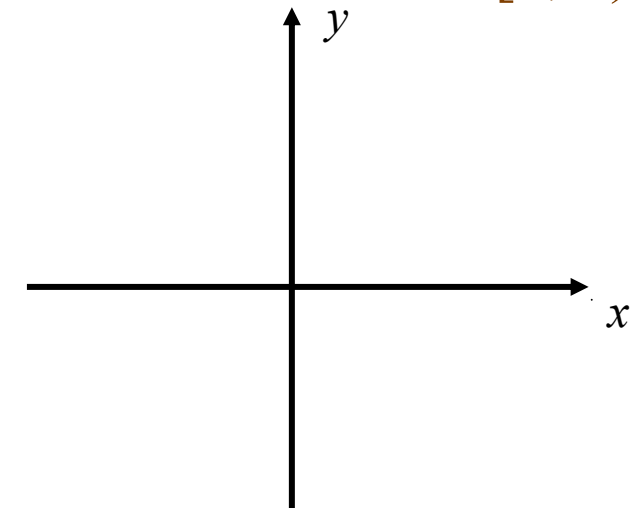
$$y = x^2 \quad \text{d: } \mathbb{R} \\ \text{r: } [0, \infty)$$



$$y = x^3 \quad \text{d: } \mathbb{R} \\ \text{r: } \mathbb{R}$$



$$y = \sqrt{x} \quad \text{d: } [0, \infty) \\ \text{r: } [0, \infty)$$

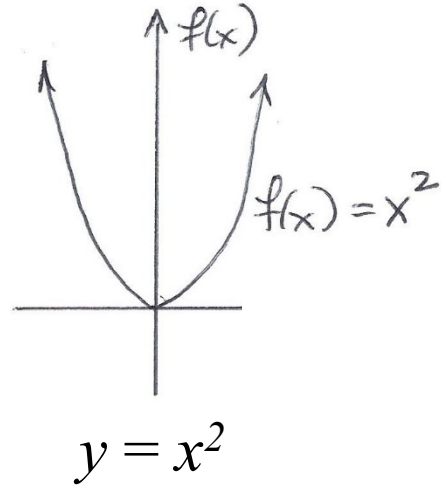


$$y = \frac{1}{x} \quad \text{d: } (-\infty, 0) \cup (0, \infty) \\ \text{r: } (-\infty, 0) \cup (0, \infty)$$

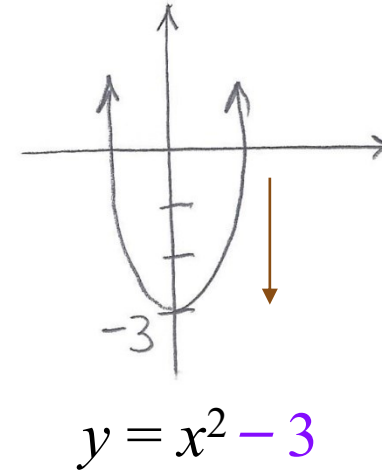
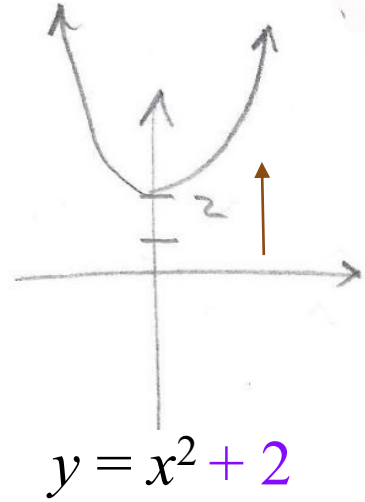
Shifting Common Graphs

Vertical Shift

$y = f(x) + C$ ← original graph moves up/down “C” units

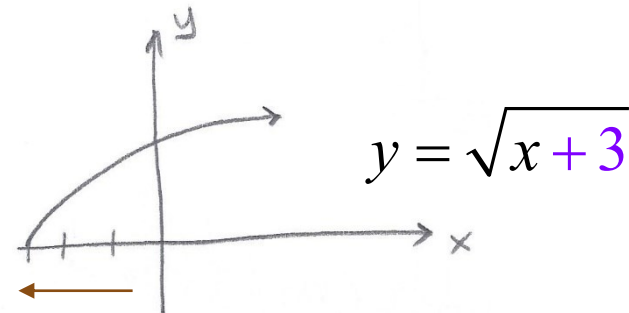
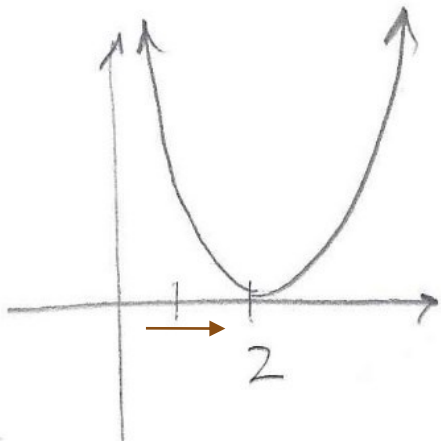


vs.



Horizontal Shift

$y = f(x - C)$ ← original graph moves left/right “C” units in OPPOSITE DIRECTION!



Graphing with Shifts - Do

Use the common graphs to sketch the following:

$$y = |x| + 1$$

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

$$y = (x - 3)^3$$

Reflections of Common Graphs

Reflection about the x -axis

$$y = -f(x)$$

Rule: negate $y \Rightarrow$ reflect over x

$$y = x^2 \quad \begin{array}{l} \text{d: } \mathbb{R} \\ \text{r: } [0, \infty) \end{array}$$

vs.

$$y = -x^2 \quad \begin{array}{l} \text{d: } \mathbb{R} \\ \text{r: } (-\infty, 0] \end{array}$$

Reflection about the y -axis

$$y = f(-x)$$

Rule: negate $x \Rightarrow$ reflect over y

$$y = \sqrt{x} \quad \begin{array}{l} \text{d: } [0, \infty) \end{array}$$

vs.

$$y = \sqrt{-x} \quad \begin{array}{l} \text{d: } (-\infty, 0] \end{array}$$