

8.4 Modifying Basic Functions

- 1) When a basic function is scaled (multiplied) by a factor greater than 1, its graph is stretched away from the x -axis. This is different than shrinking, or compressing, the graph of a basic function, which is caused by scaling it by a factor between 0 and 1.
- 3)
- $\{c : c > 1\}$
 - $\{c : 0 < c < 1\}$
 - 1
- 5) The graph of $f(x)$ is changed to become that of $g(x)$ by reflecting it over the x -axis.
- 7) The graph of $f(x) = 0$ is the x -axis itself (the line $y = 0$). This is the only function with this unique graph. Since any line reflected over itself is itself, we see that the only function that has the same graph after a reflection in the x -axis is indeed the function $f(x) = 0$.
- 9) When 1 is subtracted from an input value of a basic function, its graph is shifted to the right one unit. We can see this by plotting the graphs with the data given in our table of values. Since $Y_2(X) = (x - 1)^3$ and $Y_1(x) = x^3$, we see that the graph of $Y_2(X)$ is the same as that of $Y_1(X)$ shifted to the right 1 unit.
- 11)
- $y = f(x + 3) - 2$
 - $y = -f(x + 3)$
 - $y = -c \cdot f(x)$
 - $y = c \cdot f(x) - 2$
- 13)
- Basic absolute value function
 - Basic square root function
 - Basic cubic function
 - Basic quadratic function
 - $f(x) = |x - 2|$ Basic graph is shifted to the right 2 units
 - $f(x) = \sqrt{x + 2}$ Basic graph is shifted to the left 2 units
 - $f(x) = x^3 - 1$ Basic graph is shifted down 1 unit
 - $f(x) = (x + 1)^2 + 1$ Basic graph is shifted left 1 & up 1 unit
 - Yes
- 15) (9.5, 52)

Skill and Review

17) $y = x^2 - 5x + 9$ Quadratic with $a = 1, b = -5, c = 9$

a) Yes. For every input, there is only one unique output.

b) $x = \frac{-b}{2a} = \frac{-(-5)}{2(1)} = \frac{5}{2}$

$$y = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) + 9 = \frac{25}{4} - \frac{25}{2} + 9 = \frac{11}{4}$$

Vertex: $\left(\frac{5}{2}, \frac{11}{4}\right)$

c) $\{x : \frac{5}{2} < x\}$

19) $72a^2b - 48b^3 = 24b(3a^2 - 2b^2)$