Exercise 65

For the following exercises, write a formula for the function g that results when the graph of a given toolkit function is transformed as described.

The graph of $f(x) = \frac{1}{x^2}$ is vertically compressed by a factor of $\frac{1}{3}$, then shifted to the left 2 units and down 3 units.

Solution

To vertically compress the graph by a factor of 1/3, multiply the function by 1/3.

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

To then shift it to the left 2 units, replace x with $x + 2$.

$$\frac{1}{3(x+2)^2}$$

To then shift it down 3 units, subtract 3 from the function.

$$g(x) = \frac{1}{3(x+2)^2} - 3$$