

Exercise 60

If $g(x)$ is the transformation of $f(x) = x$ after a vertical compression by $\frac{1}{3}$, a shift left by 1, and a shift up by 3

- Write an equation for $g(x)$.
 - What is the slope of this line?
 - Find the y -intercept of this line.
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Solution

Start with the parent function,

$$f(x) = x.$$

Multiply it by $1/3$ to vertically compress it by $1/3$.

$$\frac{1}{3}x$$

To shift it to the left by 1, replace x with $x + 1$.

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

Finally, to shift it up by 3, add 3 to it.

$$\begin{aligned}g(x) &= \frac{1}{3}(x + 1) + 3 \\&= \frac{1}{3}x + \frac{1}{3} + 3 \\&= \frac{1}{3}x + \frac{10}{3}\end{aligned}$$

The slope of this line is $1/3$, and the y -intercept is $(0, 10/3)$.

