

Vertically Stretching and Shrinking Graphs

Let f be a function and c a positive real number.

- If $c > 1$, the graph of $y = cf(x)$ is the graph of $y = f(x)$ vertically stretched by multiplying each of its y-coordinates by c .
 - Draw the graph of f and **multiply each y-coordinate of $y = f(x)$ by c , vertically stretching the graph of f .**
 - Changes in the equation of $y = f(x)$: $f(x)$ is multiplied by c , $c > 1$.
- If $0 < c < 1$, the graph of $y = cf(x)$ is the graph of $y = f(x)$ vertically shrunk by multiplying each of its y-coordinates by c .
 - Draw the graph of and **multiply each y-coordinate of $y = f(x)$ by c , vertically shrinking the graph of f .**
 - Changes in the equation of $y = f(x)$: $f(x)$ is multiplied by c , $0 < c < 1$.

Example 4: Use the graph of $f(x) = x^3$ to obtain the graph of $h(x) = \frac{1}{2}x^3$.

