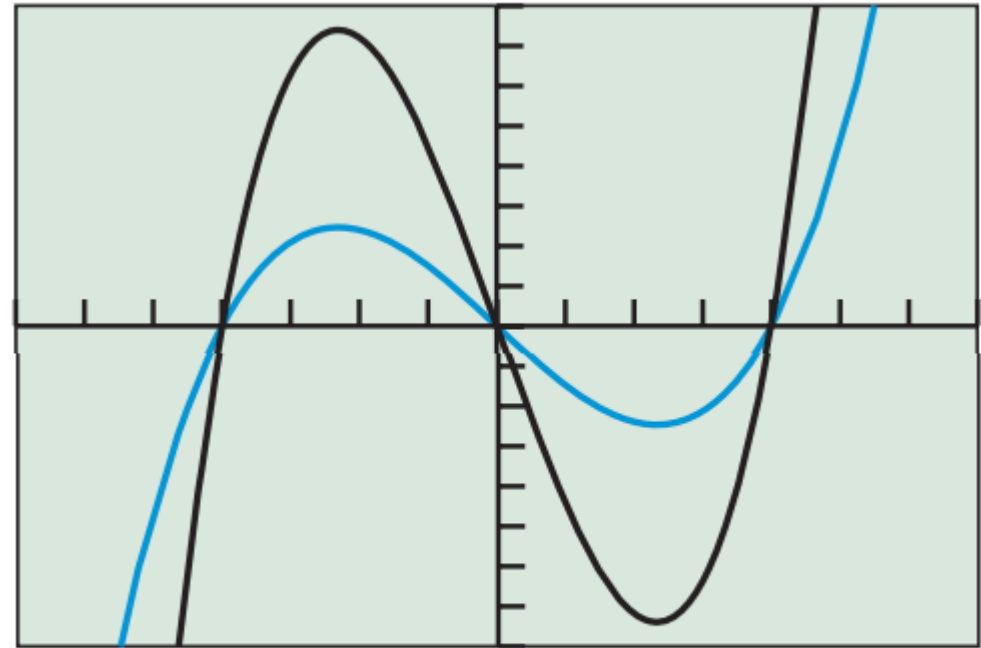


Finding Equations for Stretches and Shrinks

Let C_1 be the curve defined by $y_1 = f(x) = x^3 - 16x$. Find equations for the following non-rigid transformations of C_1 :

(a) C_2 is a vertical stretch of C_1 by a factor of 3.

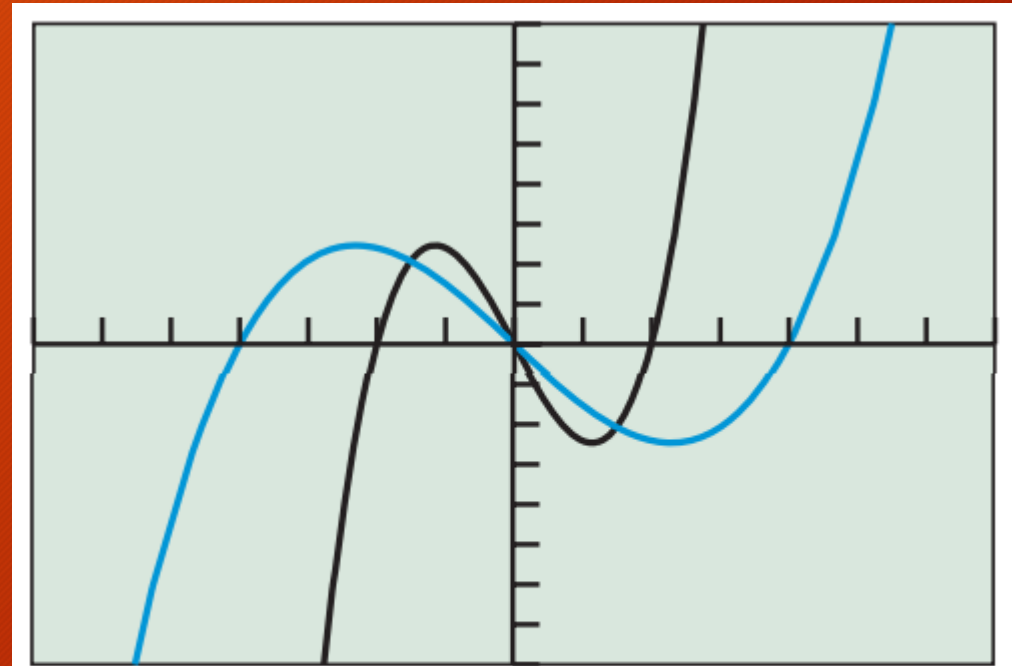


$[-7, 7]$ by $[-80, 80]$

(a)

Let C_1 be the curve defined by $y_1 = f(x) = x^3 - 16x$. Find equations for the following non-rigid transformations of C_1 :

(b) C_3 is a horizontal shrink of C_1 by a factor of $1/2$.



$[-7, 7]$ by $[-80, 80]$

(b)

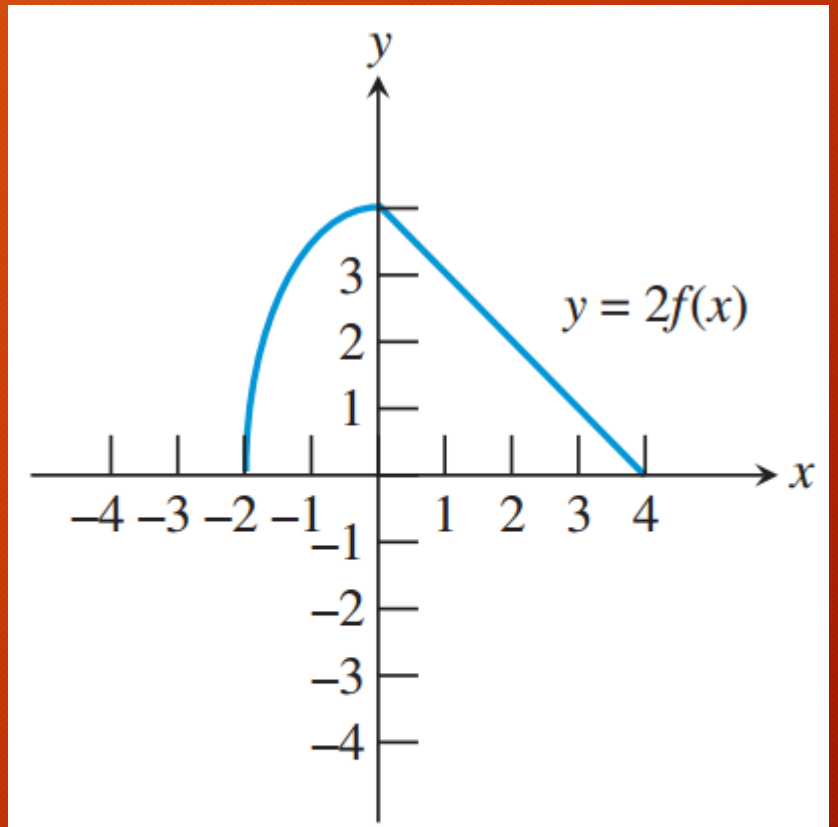
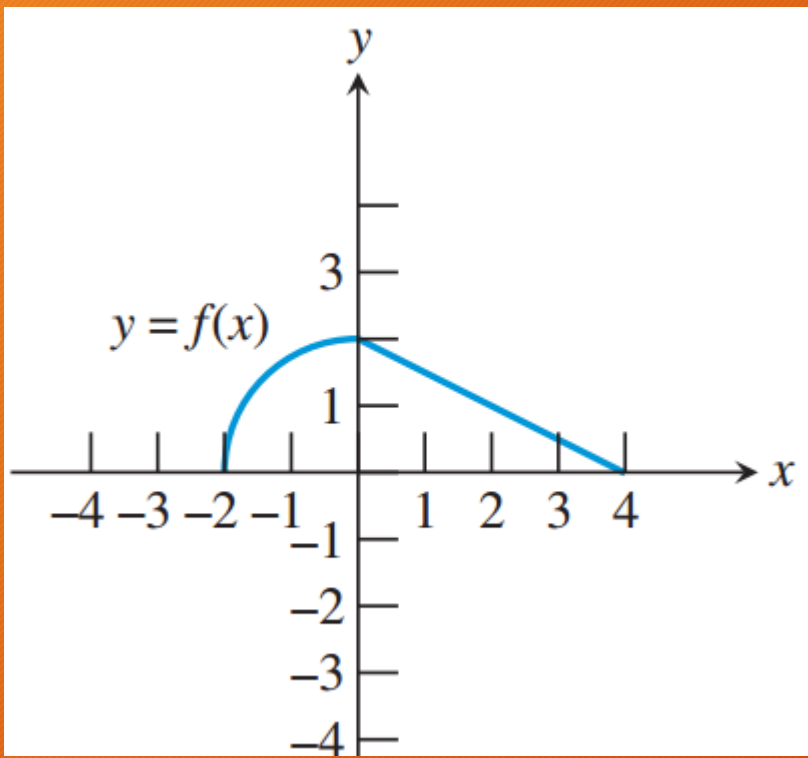
Combining Transformations in Order

(a) The graph of $y = x^2$ undergoes the following transformations, in order. Find the equation of the graph that results.

- a horizontal shift 2 units to the right
- a vertical stretch by a factor of 3
- a vertical translation 5 units up

Combining Transformations in Order

(b) Apply the transformations in (a) in the opposite order and find the equation of the graph that results.

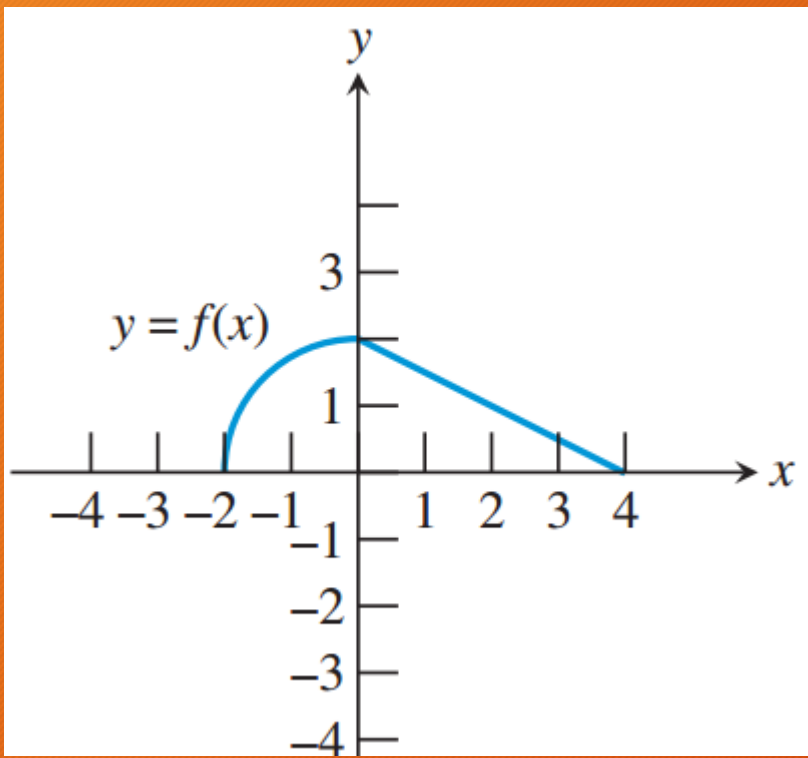


Vertical stretch
of factor 2

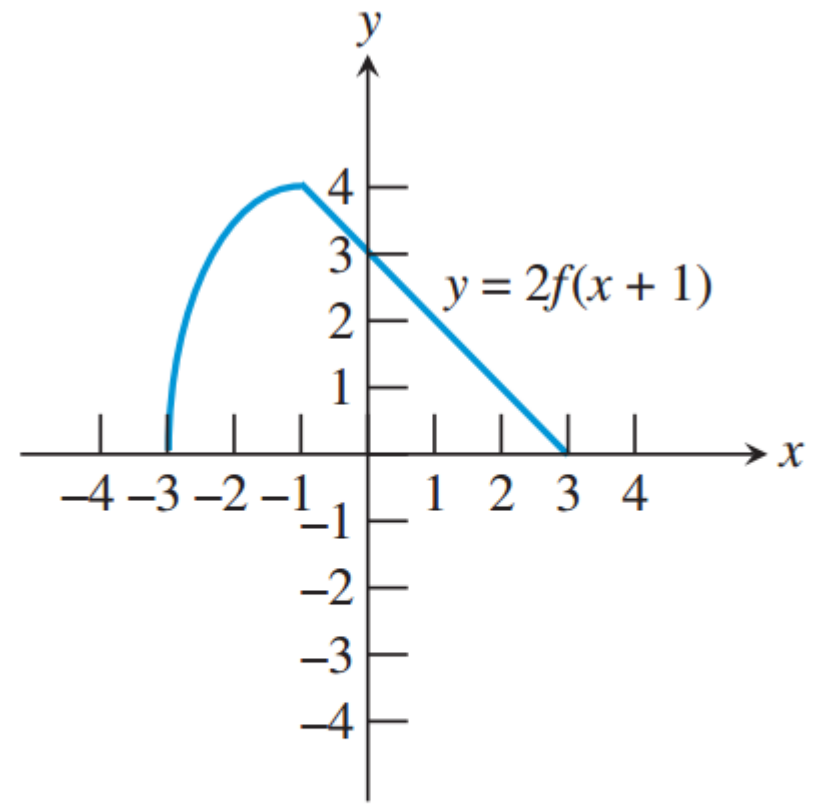
(a)

(a) a vertical stretch by a factor of 2 to get $y = 2f(x)$

Transforming a Graph Geometrically



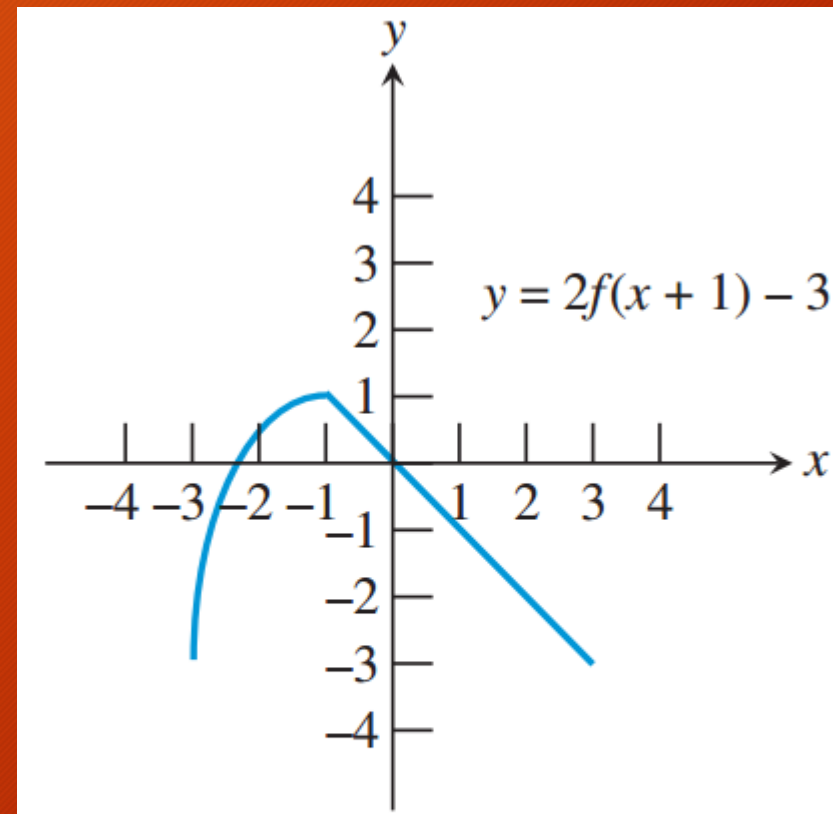
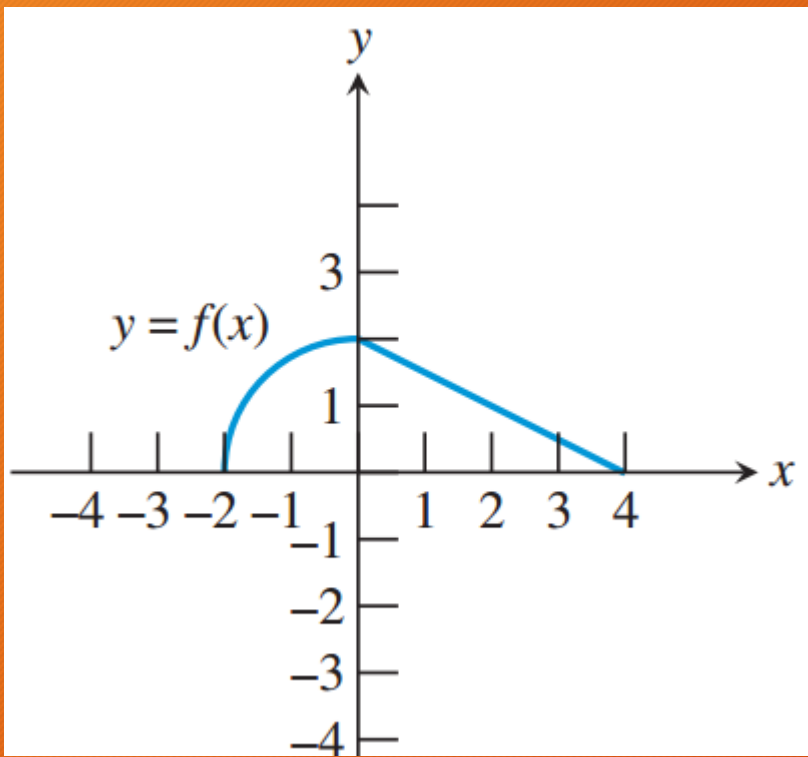
(b) a horizontal translation 1 unit to the left to get $y = 2f(x + 1)$



Horizontal translation
left 1 unit

(b)

Transforming a Graph Geometrically



Vertical translation
down 3 units

(c)

(c) a vertical translation 3 units down to get $y = 2f(x + 1) - 3$

Transforming a Graph Geometrically