

Vertical and Horizontal Transformations Handout

Vertical Transformations:

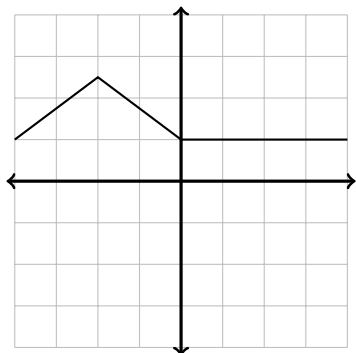
1. Shift: $f(x) + k$ (Shifts up if k is positive)
2. Reflection over x -axis: $-f(x)$
3. Stretch: $A \cdot f(x)$

Horizontal Transformations:

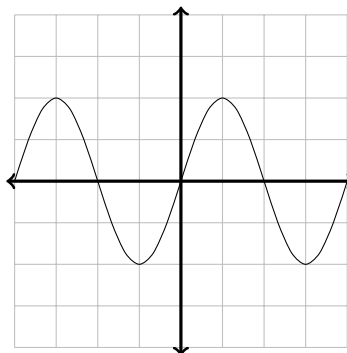
1. Shift: $f(x - h)$ (shifts *right* if h is positive)
2. Reflection over y -axis: $f(-x)$
3. Stretch: $f(Bx)$ (Stretches by $\frac{1}{B}$)

1. Given the graphs of f below, sketch $-2f(x)$.

(a)

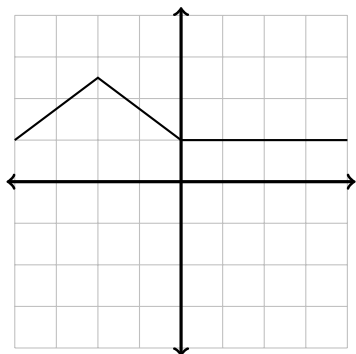


(b)

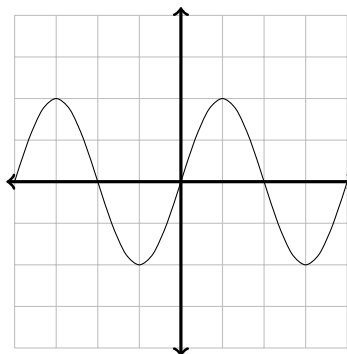


2. Given the graphs of f below, sketch $3f(x) - 2$.

(a)

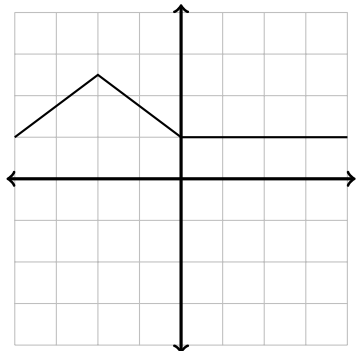


(b)

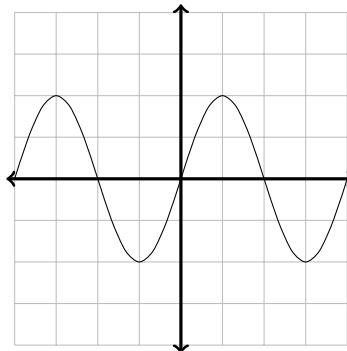


3. Given the graphs of f below, sketch $f(x+1)$.

(a)

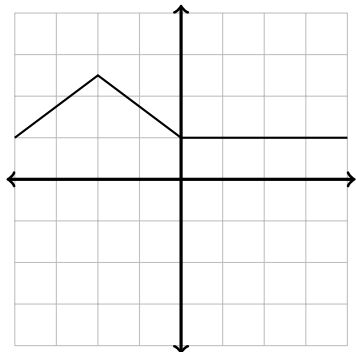


(b)

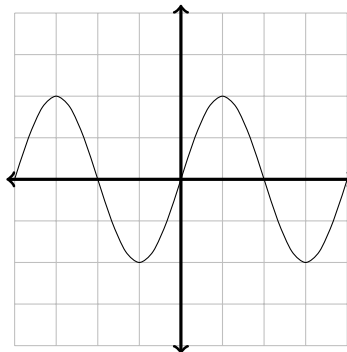


4. Given the graphs of f below, sketch $f(2x+3)$.

(a)



(b)



5. Suppose that the point $(3, 15)$ lies on the graph of f .

(a) Find a point on the graph of $-f$.

(e) Find a point on the graph of $f(x-3)$.

(b) Find a point on the graph of $f(x) - 5$.

(f) Find a point on the graph of $f(7x)$.

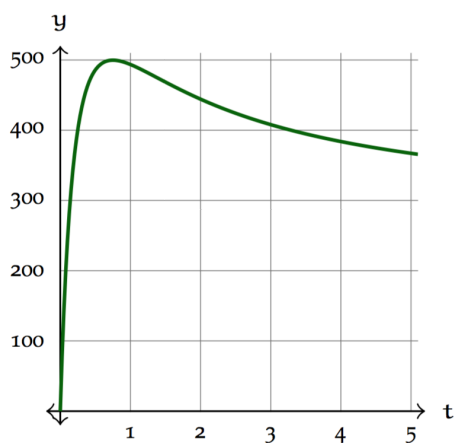
(c) Find a point on the graph of $\frac{1}{6}f(x)$.

(g) Find a point on the graph of $f(-\frac{1}{2}x)$.

(d) Find a point on the graph of $2f(x) + 1$.

(h) Find a point on the graph of $f(\frac{1}{3}(x+9))$.

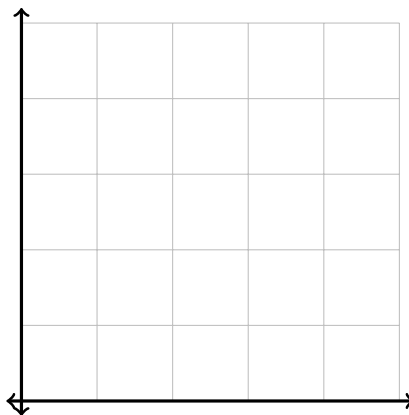
6. (1.2.12B from the book) Steve runs a website where he sells merchandise. He has been tracking that t months after the website launched it had approximately $V(t)$ new visitors. The graph of $V(t)$ is shown below.



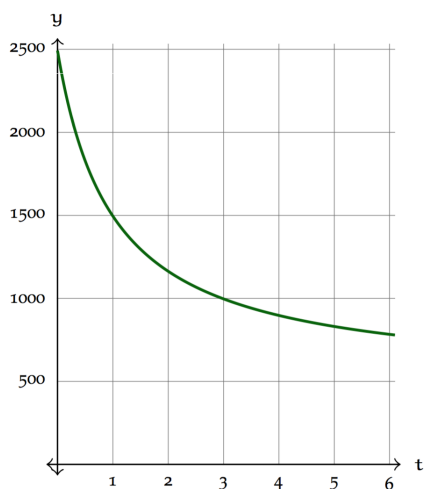
Steve approximates that one out of every five new visitors to the site makes a purchase. Let $P(t)$ be the number of purchases that are made at time t .

- (a) Write P as a transformation of V .

- (b) Sketch the graph of $P(t)$. (Be sure to indicate the scale.)



7. (1.3.11B in the book) Diane is evaluating the long-term value of a painting. She predicts that it will be worth $V(t)$ dollars t years after she buys it. The graph of $V(t)$ is shown below:



Suppose that $W(m)$ is the value of the painting m months after she buys it.

- (a) Write an equation for $W(m)$ as a transformation of V .

- (b) Sketch the graph of $W(m)$. (Be sure to include a scale.)

