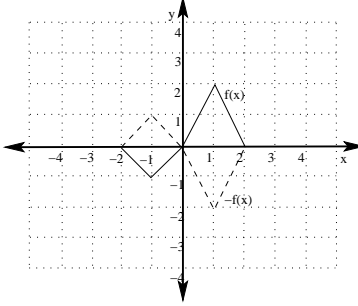
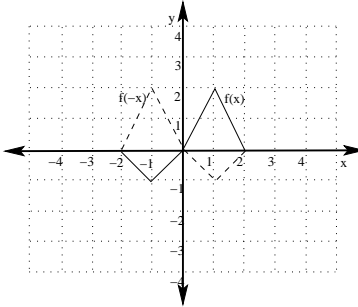
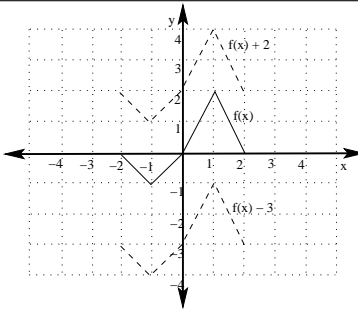
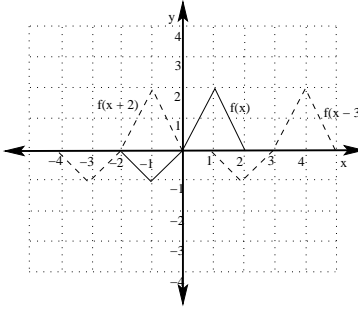
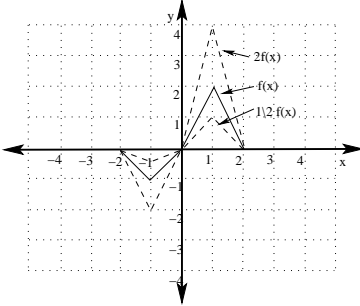
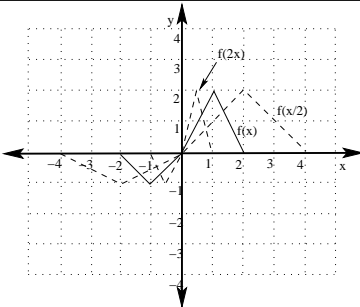


The Six Major Types of Shifts

Equation	Effect on the graph	Example:
$y = -f(x)$	Reflection across the x -axis	 <p>A coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled $f(x)$ has vertices at (0,0), (1,2), and (2,0). A dashed triangle labeled $-f(x)$ is its reflection across the x-axis, with vertices at (0,0), (1,-2), and (2,0).</p>
$y = f(-x)$	Reflection across the y -axis	 <p>A coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled $f(x)$ has vertices at (0,0), (1,2), and (2,0). A dashed triangle labeled $f(-x)$ is its reflection across the y-axis, with vertices at (0,0), (-1,2), and (-2,0).</p>
$y = f(x) + c$	Shifted Up if $c > 0$ Shifted Down if $c < 0$	 <p>A coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled $f(x)$ has vertices at (0,0), (1,2), and (2,0). A dashed triangle labeled $f(x)+2$ is shifted 2 units up, with vertices at (0,2), (1,4), and (2,2). Another dashed triangle labeled $f(x)-3$ is shifted 3 units down, with vertices at (0,-3), (1,-1), and (2,-3).</p>
$y = f(x - c)$	Shifted Right if $c > 0$ Shifted Left if $c < 0$	 <p>A coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled $f(x)$ has vertices at (0,0), (1,2), and (2,0). A dashed triangle labeled $f(x+2)$ is shifted 2 units left, with vertices at (-2,0), (-1,2), and (0,0). Another dashed triangle labeled $f(x-3)$ is shifted 3 units right, with vertices at (3,0), (4,2), and (5,0).</p>

Equation	Effect on the graph	Example:
$y = cf(x), c > 0$	Vertical stretch if $c > 1$ Vertical compression if $0 < c < 1$	
$y = f(cx), c > 0$	Horizontal compression if $c > 1$ Horizontal stretch if $0 < c < 1$	

Note: We will often combine more than one shift together to form one new function.

Example: Given $f(x)$, sketch the graph of $2f(x - 1) + 3$

