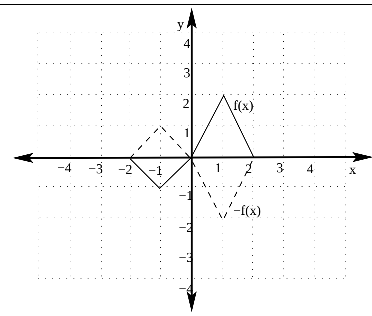
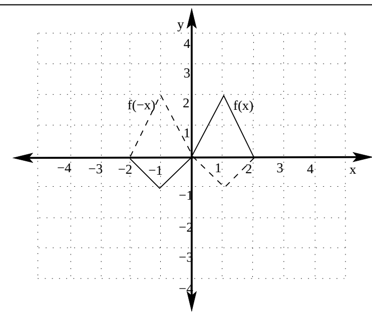
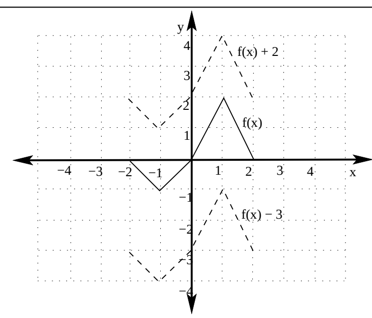
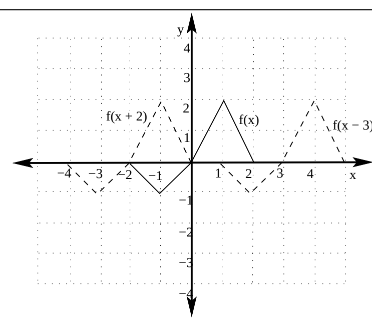
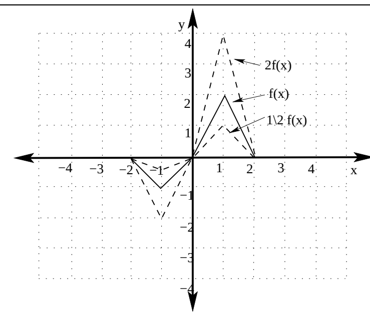
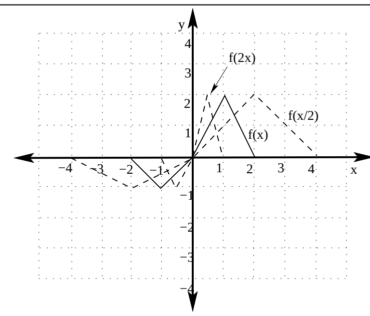
Math 127

Shifts of Functions

## The Six Major Types of Shifts

| **Equation** | **Effect on the graph** | **Example:** |
|---|---|---|
| $y = -f(x)$ | Reflection across the $x$-axis |  |
| $y = f(-x)$ | Reflection across the $y$-axis |  |
| $y = f(x) + c$ | Shifted Up if $c > 0$<br>Shifted Down if $c < 0$ |  |
| $y = f(x - c)$ | Shifted Right if $c > 0$<br>Shifted Left if $c < 0$ |  |

| **Equation** | **Effect on the graph** | **Example:** |
|---|---|---|
| $y = cf(x)$ , $c > 0$ | Vertical stretch if $c > 1$<br>Vertical compression if $0 < c < 1$ |  |
| $y = f(cx)$, $c > 0$ | Horizontal compression if $c > 1$<br>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 $2f(x-1)+3$