# Notes on Quadratic Equations – 3/25/2013

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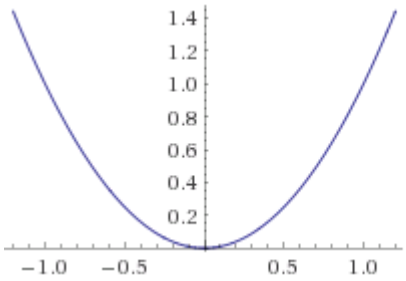
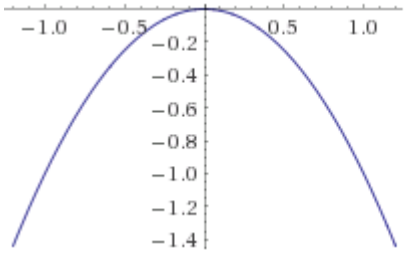
- The general quadratic equation: $f(x) = x^2$




($x$ from $-1$ to 1)

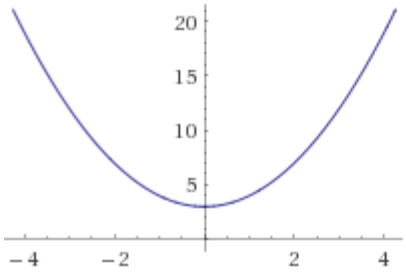
- $f(x) = -x^2$




($x$ from $-1$ to 1)

- $f(x) = x^2 + 3$ Vertical shift up 3 units

  $f(x) = x^2 + k$ Vertical shift up/down $k$ units



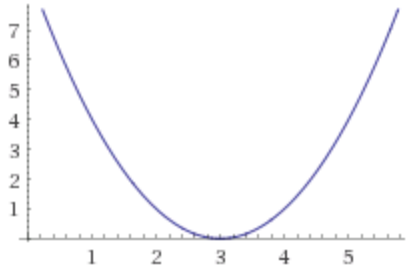

($x$ from $-4$ to 4)

- $f(x) = (x - 3)^2$ Horizontal shift 3 units to the right

  $f(x) = (x - k)^2$ Horizontal shift $k$ units to the right/left

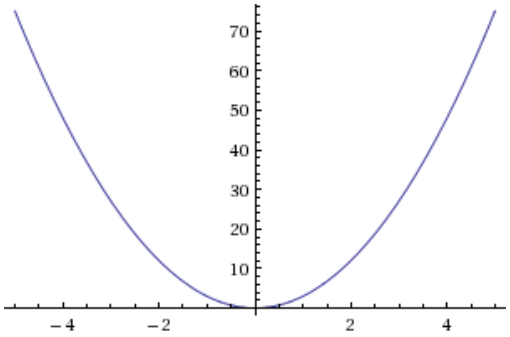
  $f(x) = (x + 3)^2$ Horizontal shift 3 units to the left

Graph of $f(x) = (x - 3)^2$




($x$ from 0 to 5)

- $f(x) = 3x^2$ Vertical **stretch** by a factor of 3. Makes the graph skinnier by a factor of 3
  $f(x) = k \cdot x^2$ Makes the graph skinnier by a factor of $k$ if $k > 1$




- $f(x) = \frac{1}{2}x^2$ Vertical **shrink** by a factor of 2. Makes the function wider by a factor of 2
  $f(x) = k \cdot x^2$ Makes the function wider by a factor of $k$ if $0 < k < 1$