

Vertex of the Quadratic

Given a quadratic $h(x) = ax^2 + bx + c$ compute its value at

$$x_1 = -\frac{b}{2a} \text{ namely } h(x_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at $x_1 + h$, namely

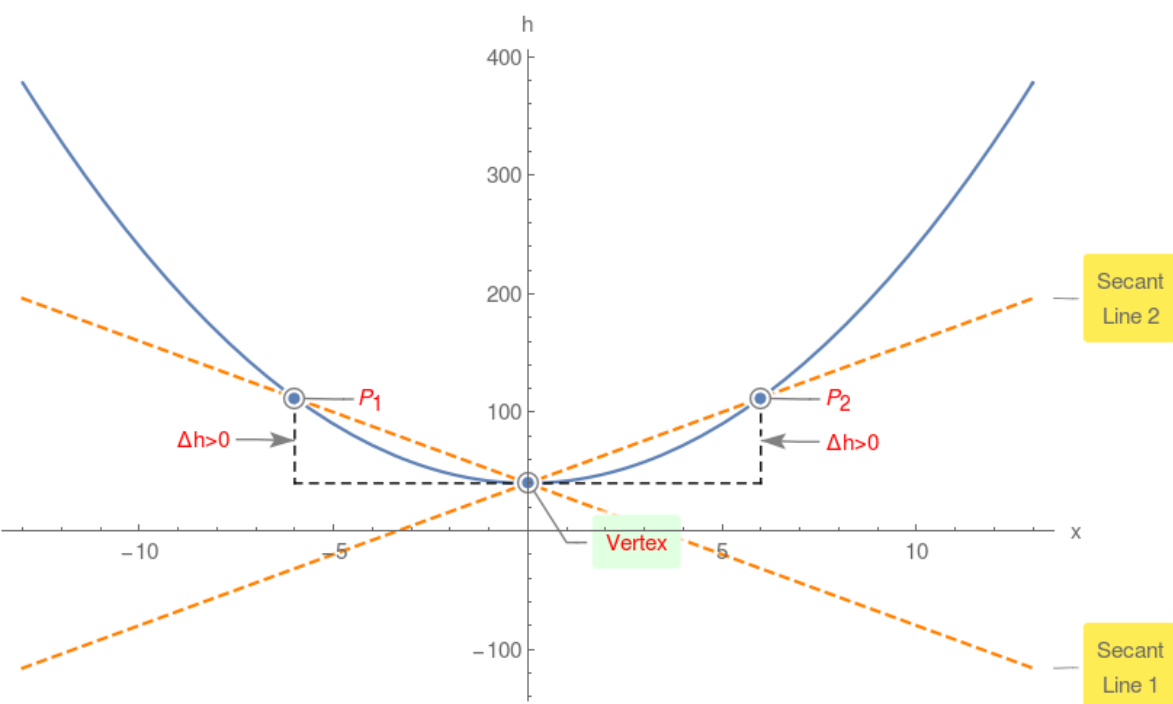
$$h(x_1 + h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = h(x_1 + h) - h(x_1) = ah^2$$

Since $h^2 > 0$, therefore if $a > 0$ then $\Delta > 0$ or vertex is the global minimum!

Example 1.

$$h(x) = 2x^2 + 40$$



However if $a < 0$ then $\Delta < 0$ or vertex is the global maximum!

Example 2.

$$h(x) = -2x^2 - 12x + 53$$

