

Vertex of the Quadratic

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

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

Now compute the same quadratic at x_1+h , namely

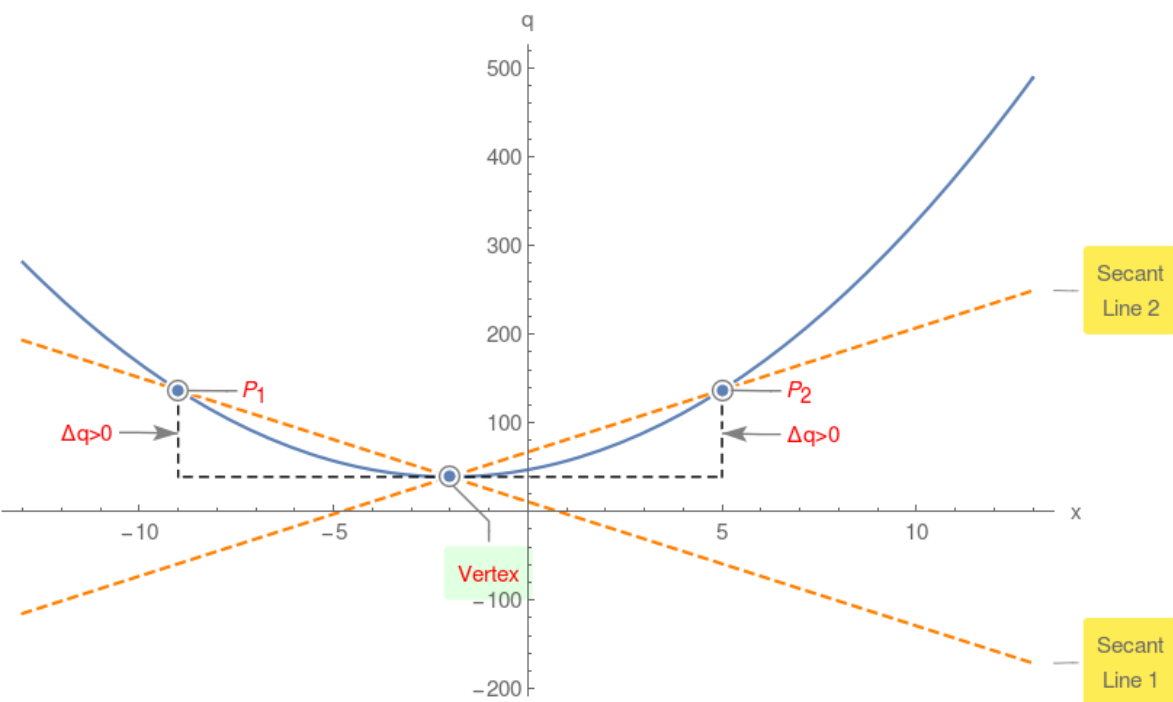
$$q(x_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

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

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

Example 1.

$$q(x) = 2x^2 + 8x + 47$$



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

Example 2.

$$q(x) = -3x^2 + 12x - 54$$

