

Vertex of the Quadratic

Given a quadratic $q(p) = ap^2 + bp + c$ compute its value at

$$p_1 = -\frac{b}{2a} \text{ namely } q(p_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at $p_1 + h$, namely

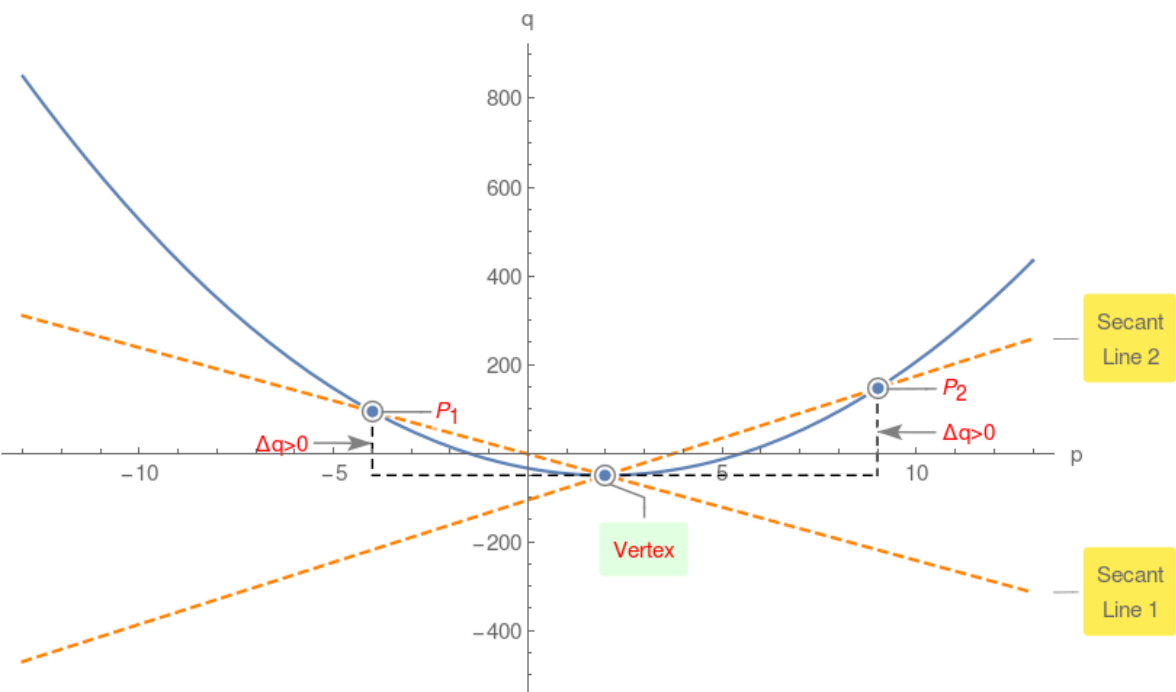
$$q(p_1 + h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = q(p_1 + h) - q(p_1) = ah^2$$

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

Example 1.

$$q(p) = 4p^2 - 16p - 34$$



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

Example 2.

$$q(p) = -p^2 - 69$$

