

Vertex of the Quadratic

Given a quadratic $y(k) = ak^2 + bk + c$ compute its value at

$$k_1 = -\frac{b}{2a} \text{ namely } y(k_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at k_1+h , namely

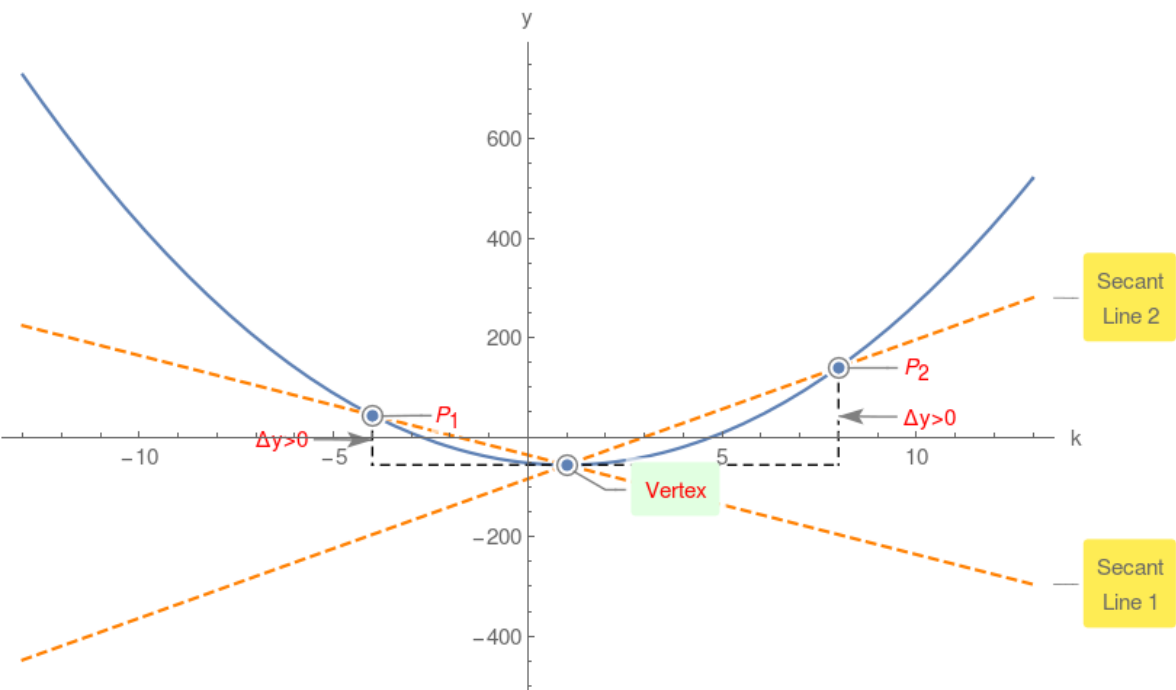
$$y(k_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = y(k_1+h) - y(k_1) = ah^2$$

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

Example 1.

$$y(k) = 4k^2 - 8k - 52$$



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

Example 2.

$$y(k) = -2k^2 - 40$$

