

Vertex of the Quadratic

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

$$y_1 = -\frac{b}{2a} \text{ namely } k(y_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at $y_1 + h$, namely

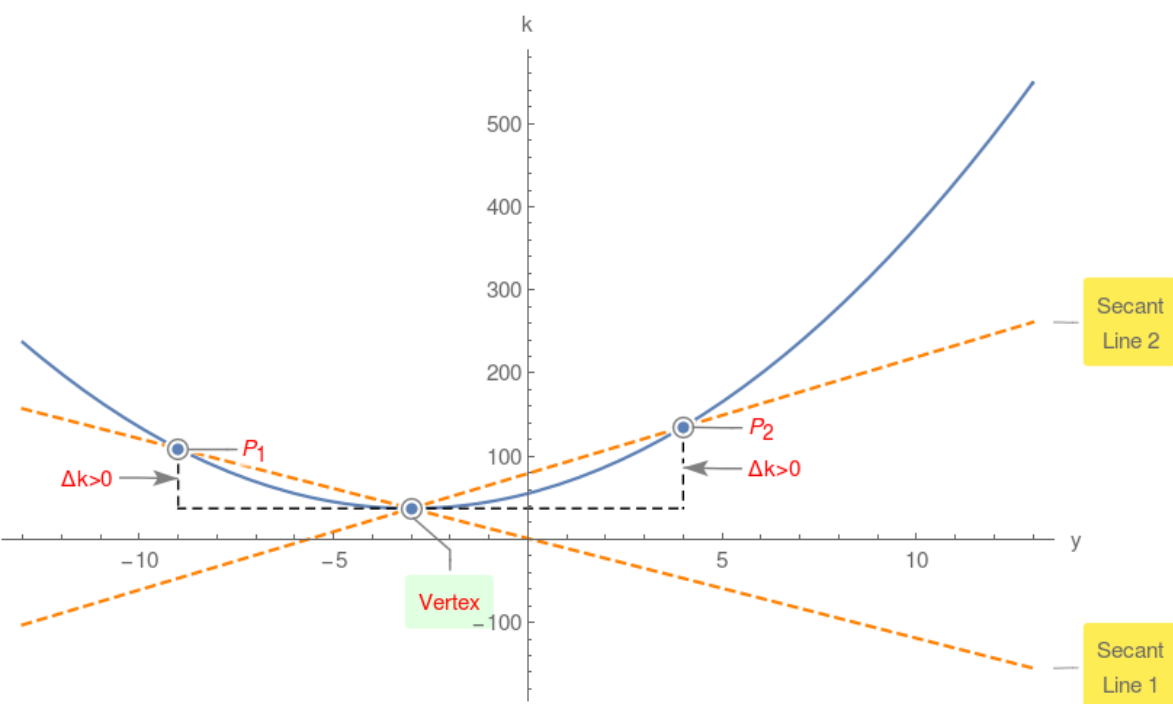
$$k(y_1 + h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = k(y_1 + h) - k(y_1) = ah^2$$

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

Example 1.

$$k(y) = 2y^2 + 12y + 55$$



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

Example 2.

$$k(y) = -y^2 - 4y + 70$$

