

## 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

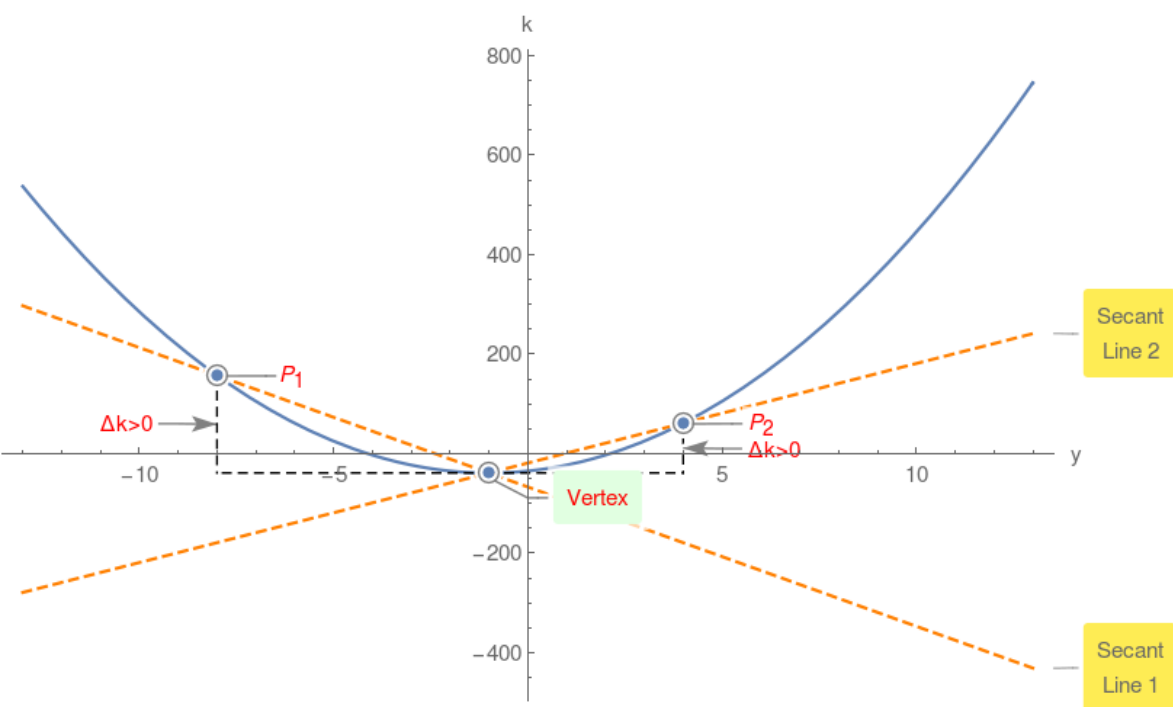
$$k(y_1 + h) = -\frac{b^2}{4a} + ah^2 + c$$

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

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

### Example 1.

$$k(y) = 4y^2 + 8y - 35$$



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

### Example 2.

$$k(y) = -y^2 + 6y + 40$$

