

Vertex of the Quadratic

Given a quadratic $w(b) = a b^2 + b^2 + c$ compute its value at

$$b_1 = -\frac{b}{2a} \text{ namely } w(b_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at b_1+h , namely

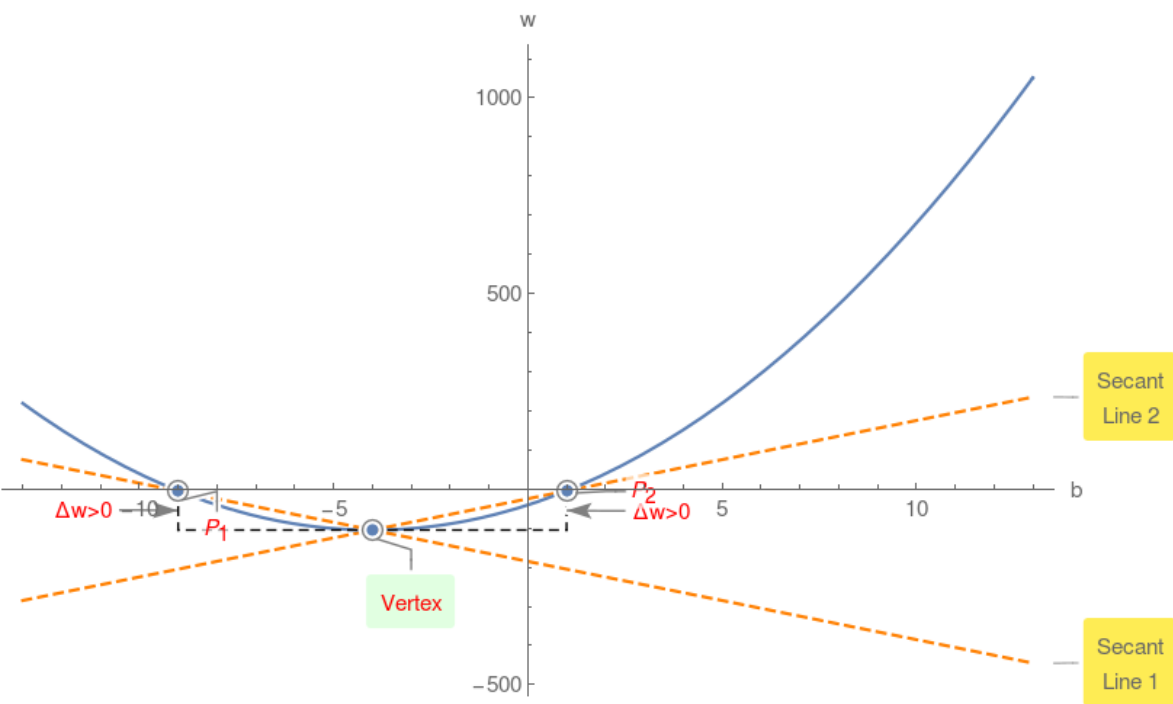
$$w(b_1+h) = -\frac{b^2}{4a} + a h^2 + c$$

$$\text{Compute } \Delta = w(b_1+h) - w(b_1) = a h^2$$

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

Example 1.

$$w(b) = 4b^2 + 32b - 41$$



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

Example 2.

$$w(b) = -b^2 + 8b + 51$$

