

Vertex of the Quadratic

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

$$w_1 = -\frac{b}{2a} \text{ namely } m(w_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at $w_1 + h$, namely

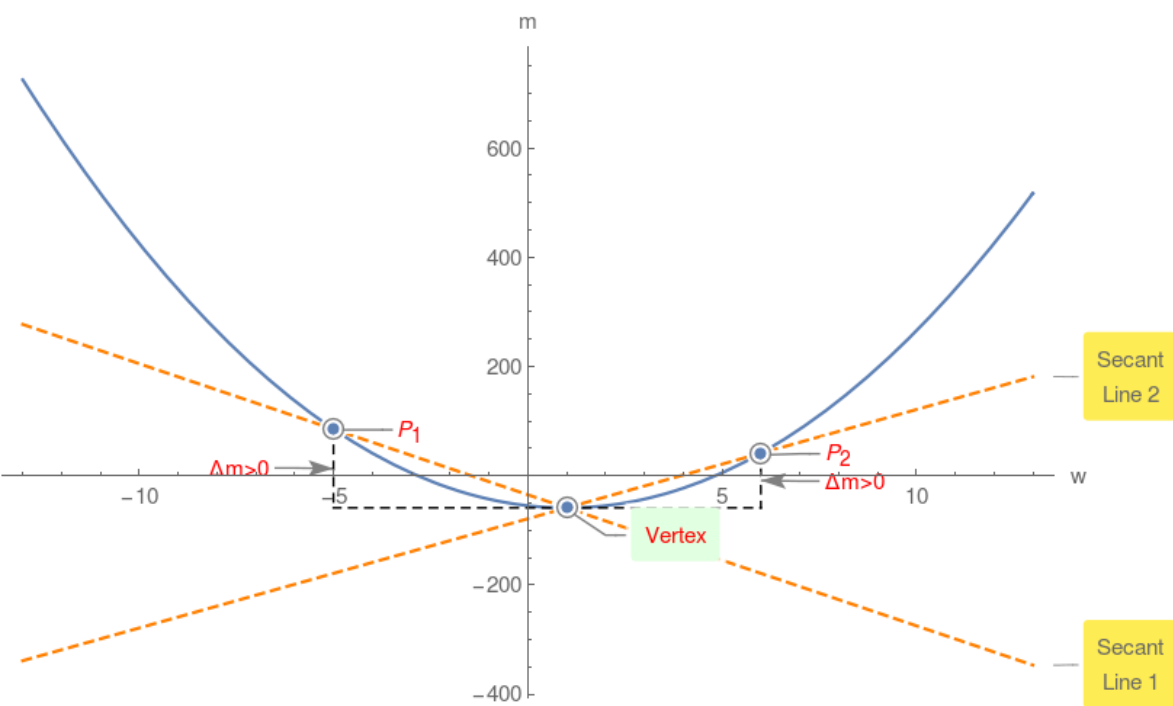
$$m(w_1 + h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = m(w_1 + h) - m(w_1) = ah^2$$

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

Example 1.

$$m(w) = 4w^2 - 8w - 55$$



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

Example 2.

$$m(w) = -4w^2 + 16w + 46$$

