

Vertex of the Quadratic

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

$$f_1 = -\frac{b}{2a} \text{ namely } w(f_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at f_1+h , namely

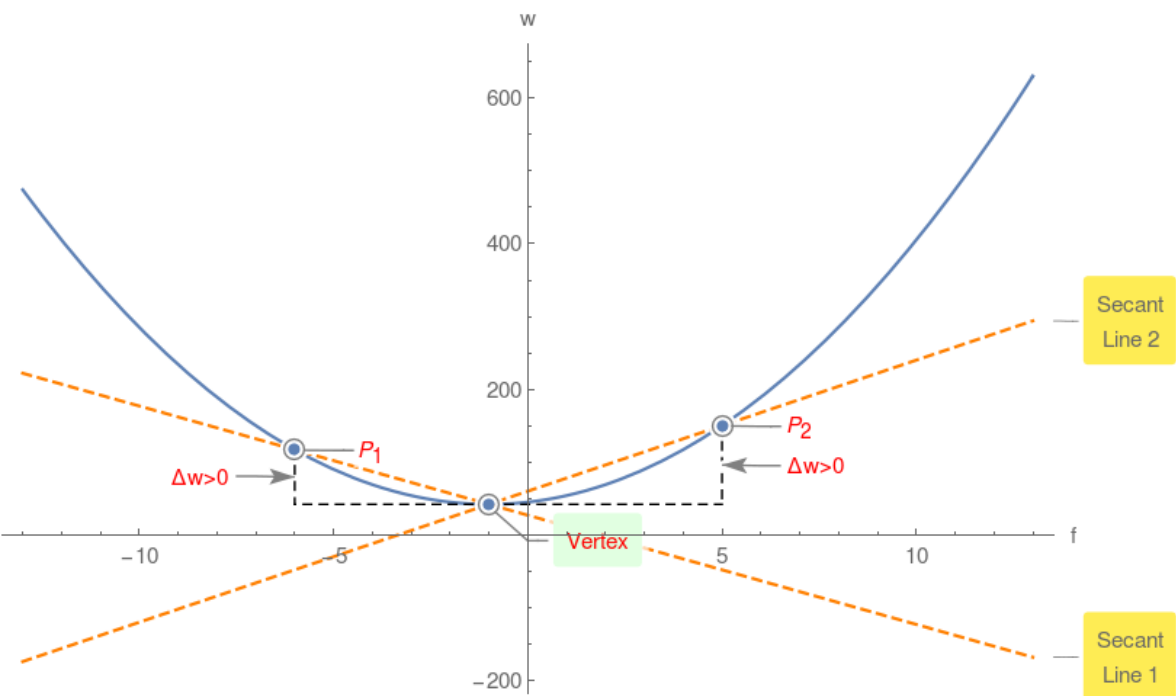
$$w(f_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = w(f_1+h) - w(f_1) = ah^2$$

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

Example 1.

$$w(f) = 3f^2 + 6f + 45$$



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

Example 2.

$$w(f) = -f^2 + 2f + 66$$

