

Vertex of the Quadratic

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

$$d_1 = -\frac{b}{2a} \text{ namely } t(d_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at $d_1 + h$, namely

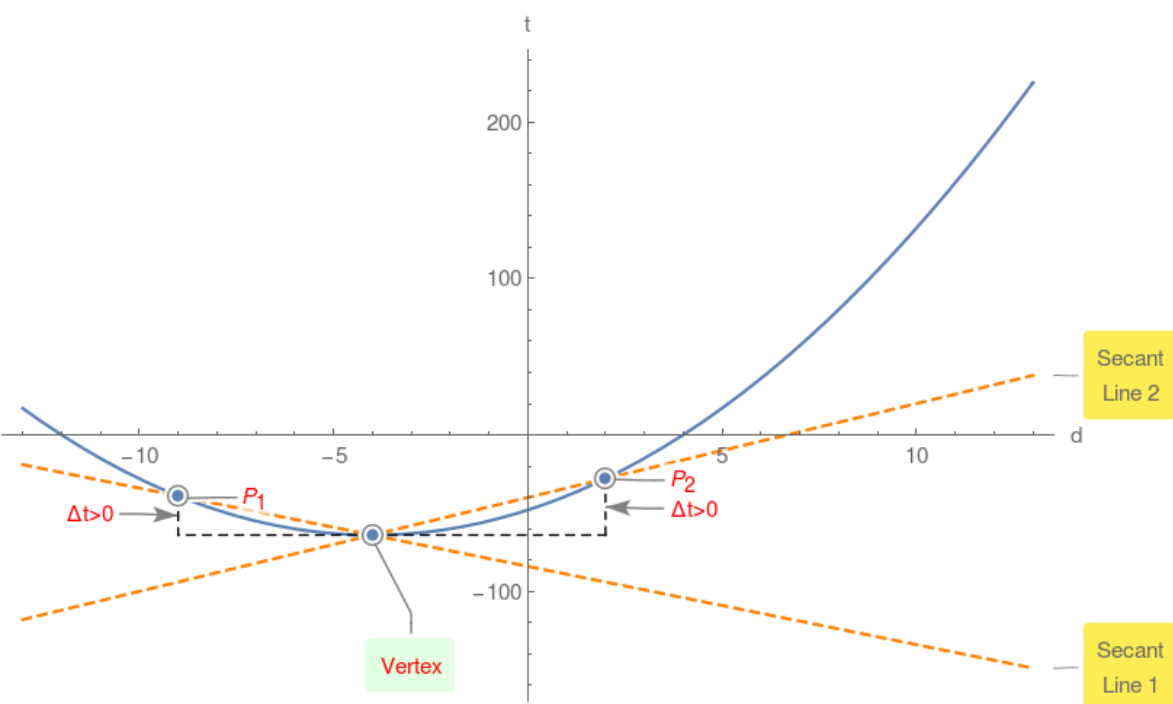
$$t(d_1 + h) = -\frac{b^2}{4a} + a h^2 + c$$

$$\text{Compute } \Delta = t(d_1 + h) - t(d_1) = a h^2$$

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

Example 1.

$$t(d) = d^2 + 8d - 48$$



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

Example 2.

$$t(d) = -2d^2 - 12d + 40$$

