Vertex of the Quadratic

Given a quadratic $t(e) = a\,e^2 + b\,e + c$ compute its value at $e_1 = -\frac{b}{2\,a}$ namely $t(e_1) = c - \frac{b^2}{4\,a}$

Now compute the same quadratic at $e_1 + h$, namely

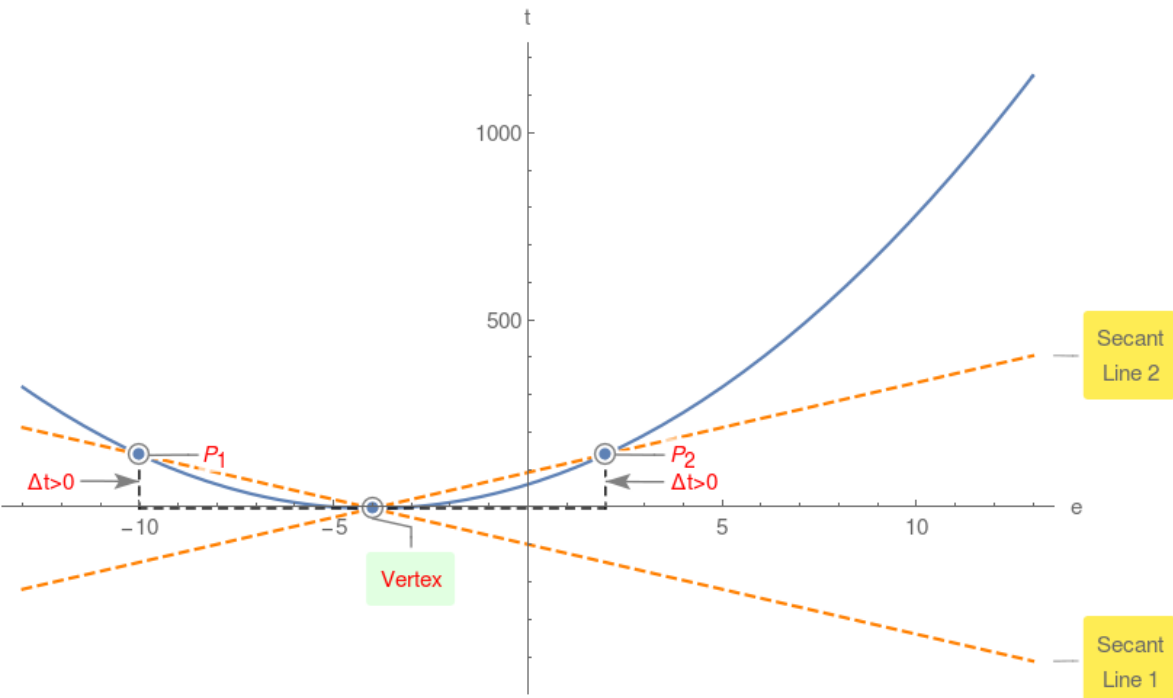
$t(e_1 + h) = -\frac{b^2}{4\,a} + a\,h^2 + c$

Compute $\triangle = t(e_1 + h) - t(e_1) = a\,h^2$

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

Example 1.

$t(e) = 4\,e^2 + 32\,e + 60$



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

Example 2.

$t(e) = -2\,e^2 - 4\,e + 43$