

Vertex of the Quadratic

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

$$e_1 = -\frac{b}{2a} \text{ namely } q(e_1) = c - \frac{b^2}{4a}$$

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

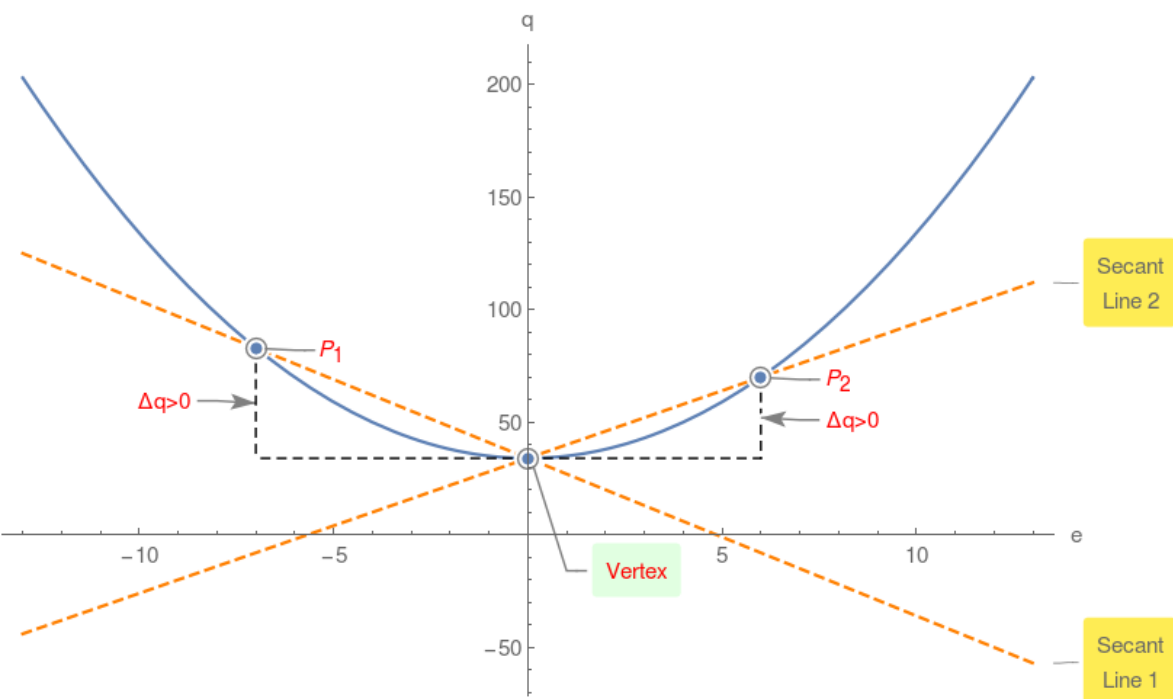
$$q(e_1 + h) = -\frac{b^2}{4a} + a h^2 + c$$

$$\text{Compute } \Delta = q(e_1 + h) - q(e_1) = a h^2$$

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

Example 1.

$$q(e) = e^2 + 34$$



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

Example 2.

$$q(e) = -4 e^2 + 32 e + 55$$

