

Vertex of the Quadratic

Given a quadratic $p(r) = ar^2 + br + c$ compute its value at

$$r_1 = -\frac{b}{2a} \text{ namely } p(r_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at r_1+h , namely

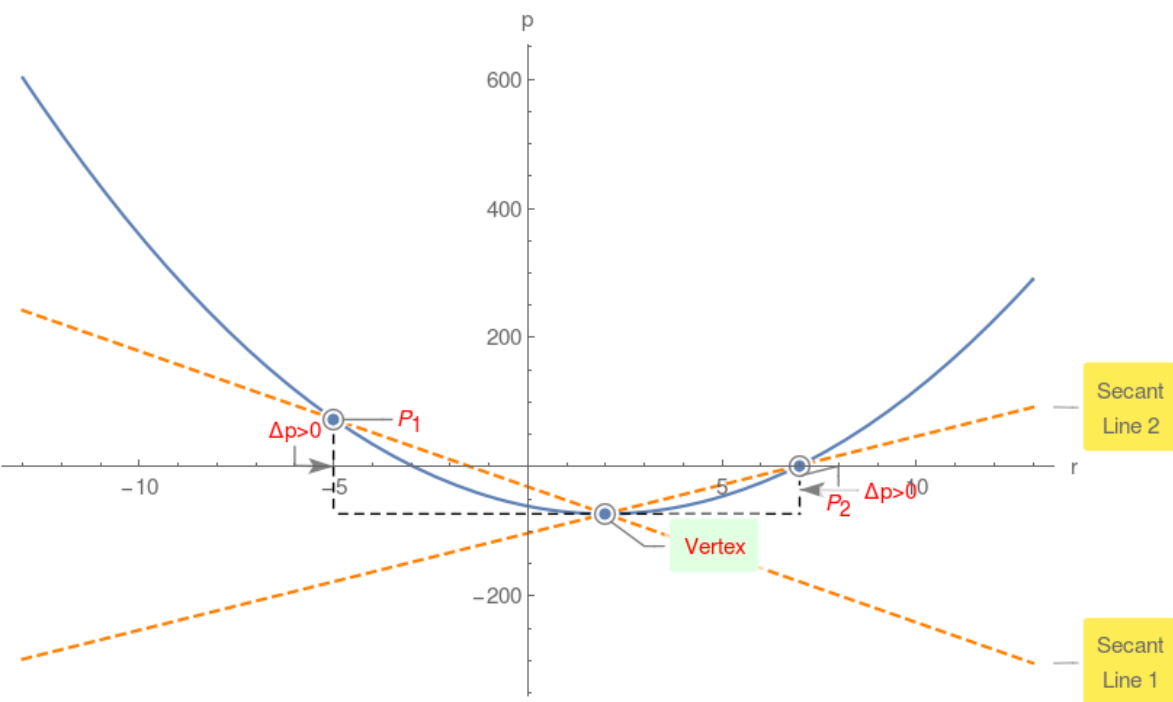
$$p(r_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = p(r_1+h) - p(r_1) = ah^2$$

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

Example 1.

$$p(r) = 3r^2 - 12r - 61$$



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

Example 2.

$$p(r) = -3r^2 - 12r - 53$$

