Vertex of the Quadratic

Given a quadratic $n(c) = a\,c^2 + b\,c + c$ compute its value at $c_1 = -\frac{b}{2\,a}$ namely $n(c_1) = c - \frac{b^2}{4\,a}$

Now compute the same quadratic at $c_1 + h$, namely

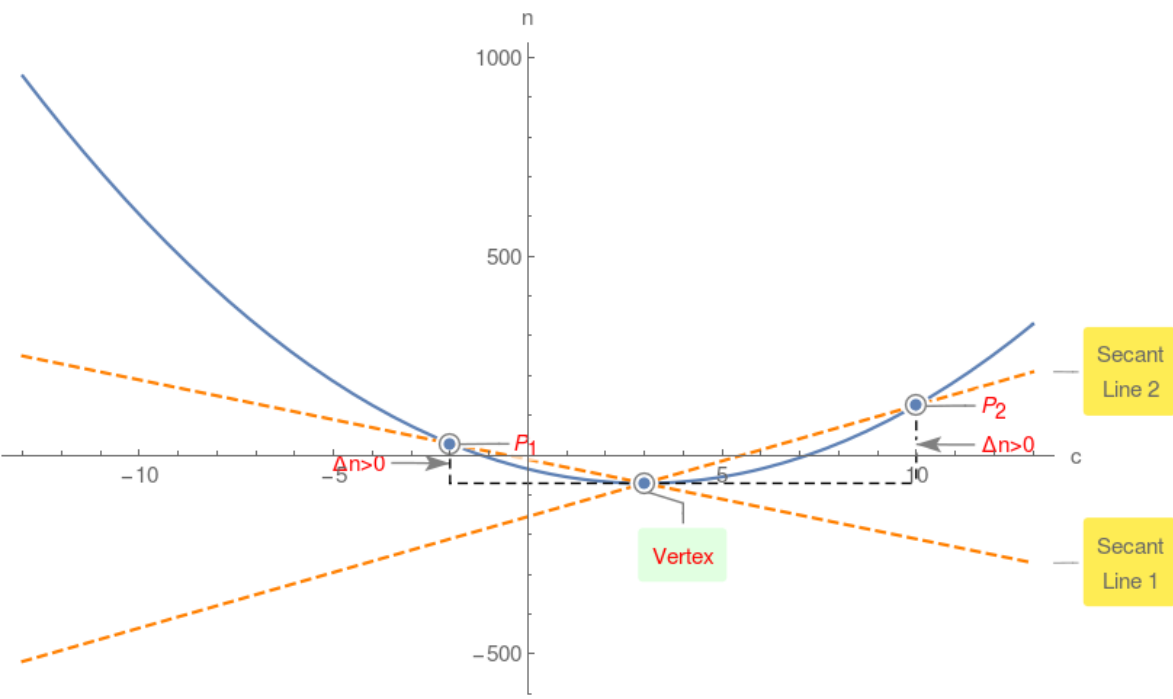
$n(c_1 + h) = -\frac{b^2}{4\,a} + a\,h^2 + c$

Compute $\triangle = n(c_1 + h) - n(c_1) = a\,h^2$

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

Example 1.

$n(c) = 4\,c^2 - 24\,c - 35$



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

Example 2.

$n(c) = -4\,c^2 - 8\,c - 38$