Vertex of the Quadratic

Given a quadratic $j(n) = a\,n^2 + b\,n + c$ compute its value at $n_1 = -\frac{b}{2\,a}$ namely $j(n_1) = c - \frac{b^2}{4\,a}$

Now compute the same quadratic at $n_1 + h$, namely

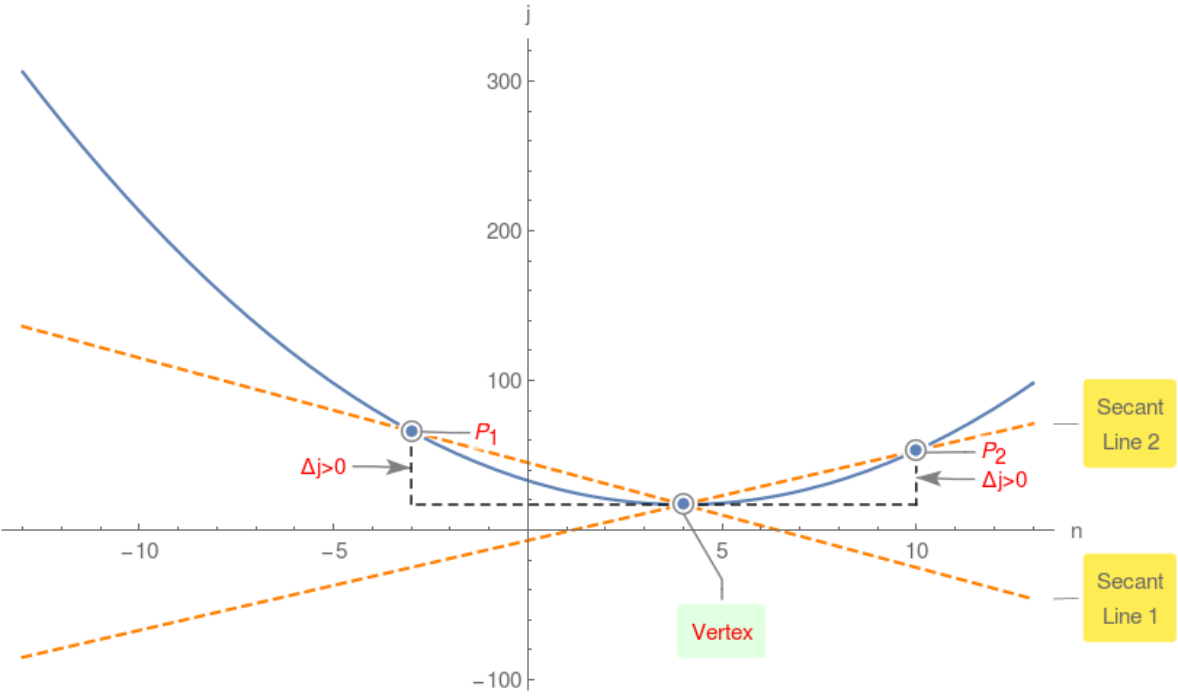
$j(n_1 + h) = -\frac{b^2}{4\,a} + a\,h^2 + c$

Compute $\triangle = j(n_1 + h) - j(n_1) = a\,h^2$

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

Example 1.

$j(n) = n^2 - 8\,n + 33$



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

Example 2.

$j(n) = -2\,n^2 - 16\,n - 65$