Vertex of the Quadratic

Given a quadratic $s(h) = a\,h^2 + b\,h + c$ compute its value at $h_1 = -\frac{b}{2\,a}$ namely $s(h_1) = c - \frac{b^2}{4\,a}$

Now compute the same quadratic at $h_1 + h$, namely

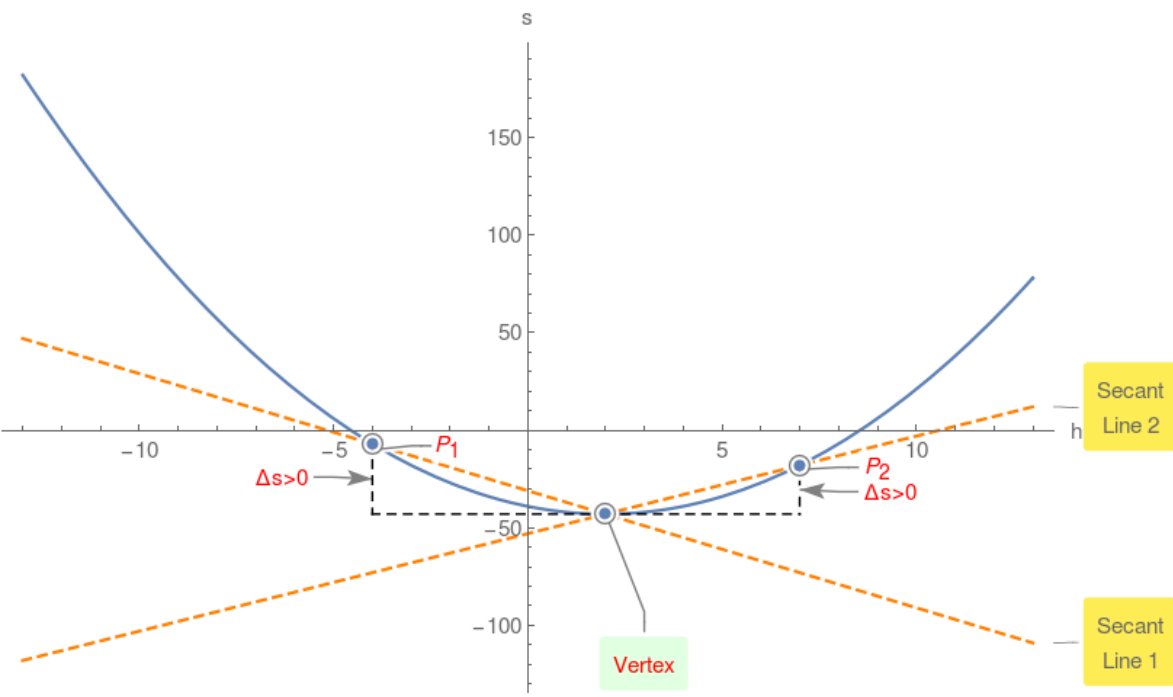
$s(h_1 + h) = -\frac{b^2}{4\,a} + a\,h^2 + c$

Compute $\triangle = s(h_1 + h) - s(h_1) = a\,h^2$

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

Example 1.

$s(h) = h^2 - 4\,h - 39$



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

Example 2.

$s(h) = 44 - 4\,h^2$