Vertex of the Quadratic

Given a quadratic $m(s) = a\,s^2 + b\,s + c$ compute its value at $s_1 = -\frac{b}{2\,a}$ namely $m(s_1) = c - \frac{b^2}{4\,a}$

Now compute the same quadratic at $s_1 + h$, namely

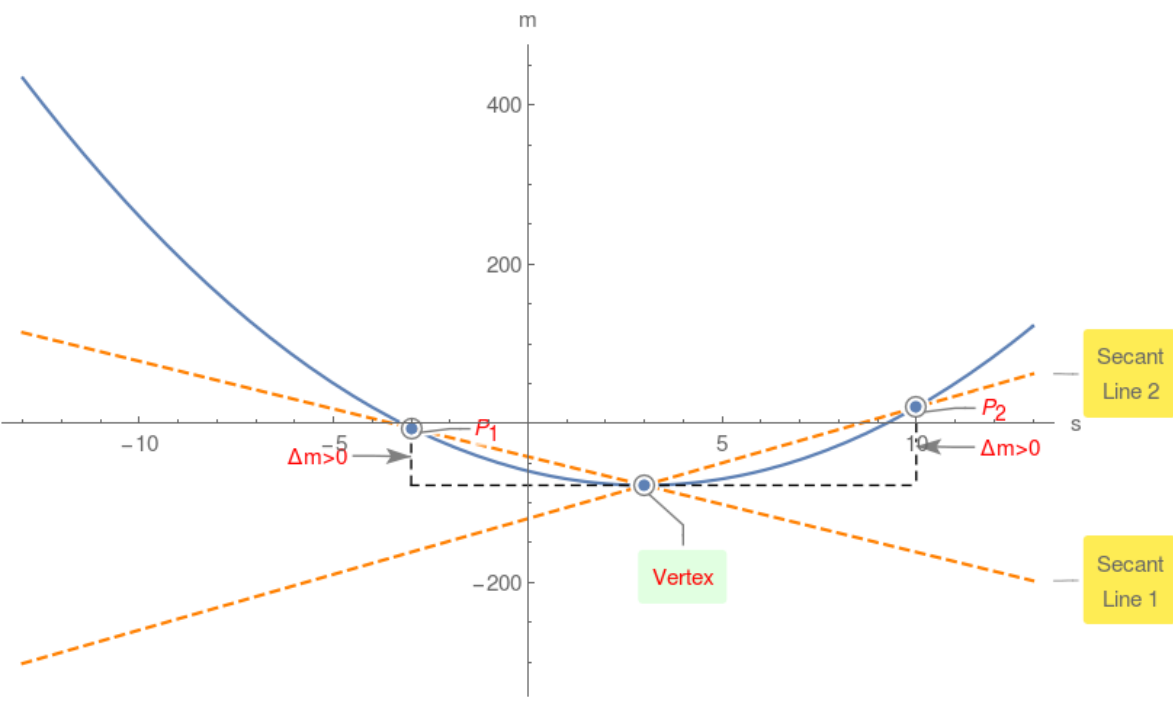
$m(s_1 + h) = -\frac{b^2}{4\,a} + a\,h^2 + c$

Compute $\triangle = m(s_1 + h) - m(s_1) = a\,h^2$

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

Example 1.

$m(s) = 2\,s^2 - 12\,s - 60$



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

Example 2.

$m(s) = -2\,s^2 + 4\,s - 42$