

# Vertex of the Quadratic

Given a quadratic  $p(m) = am^2 + bm + c$  compute its value at

$$m_1 = -\frac{b}{2a} \text{ namely } p(m_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at  $m_1+h$ , namely

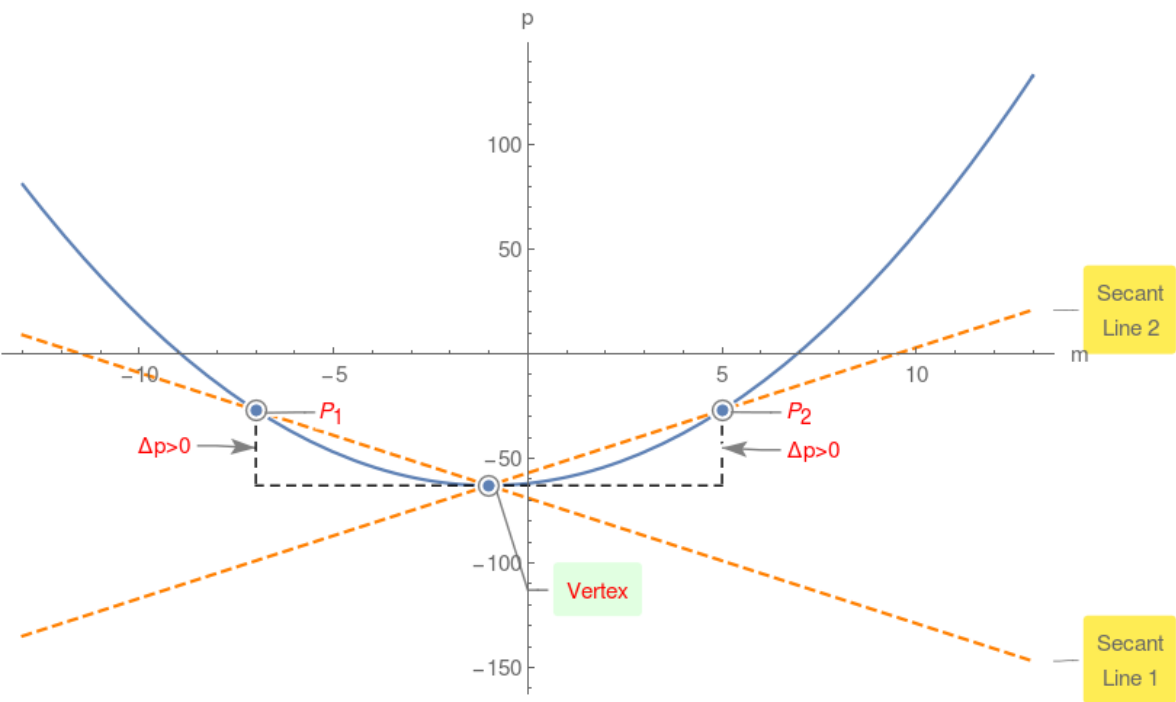
$$p(m_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = p(m_1+h) - p(m_1) = ah^2$$

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

## Example 1.

$$p(m) = m^2 + 2m - 62$$



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

## Example 2.

$$p(m) = -4m^2 - 8m - 45$$

