

# Vertex of the Quadratic

Given a quadratic  $u(j) = aj^2 + bj + c$  compute its value at

$$j_1 = -\frac{b}{2a} \text{ namely } u(j_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at  $j_1+h$ , namely

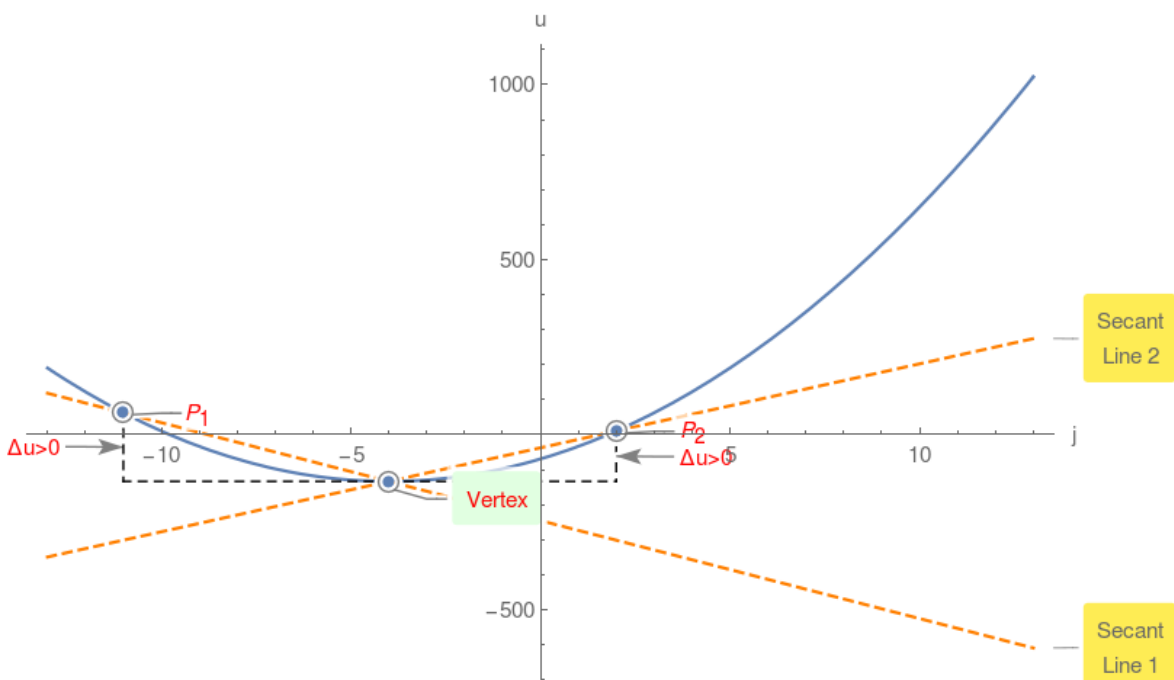
$$u(j_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = u(j_1+h) - u(j_1) = ah^2$$

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

## Example 1.

$$u(j) = 4j^2 + 32j - 70$$



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

## Example 2.

$$u(j) = 63 - j^2$$

