

## Vertex of the Quadratic

Given a quadratic  $u(c) = ac^2 + bc + c$  compute its value at

$$c_1 = -\frac{b}{2a} \text{ namely } u(c_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at  $c_1+h$ , namely

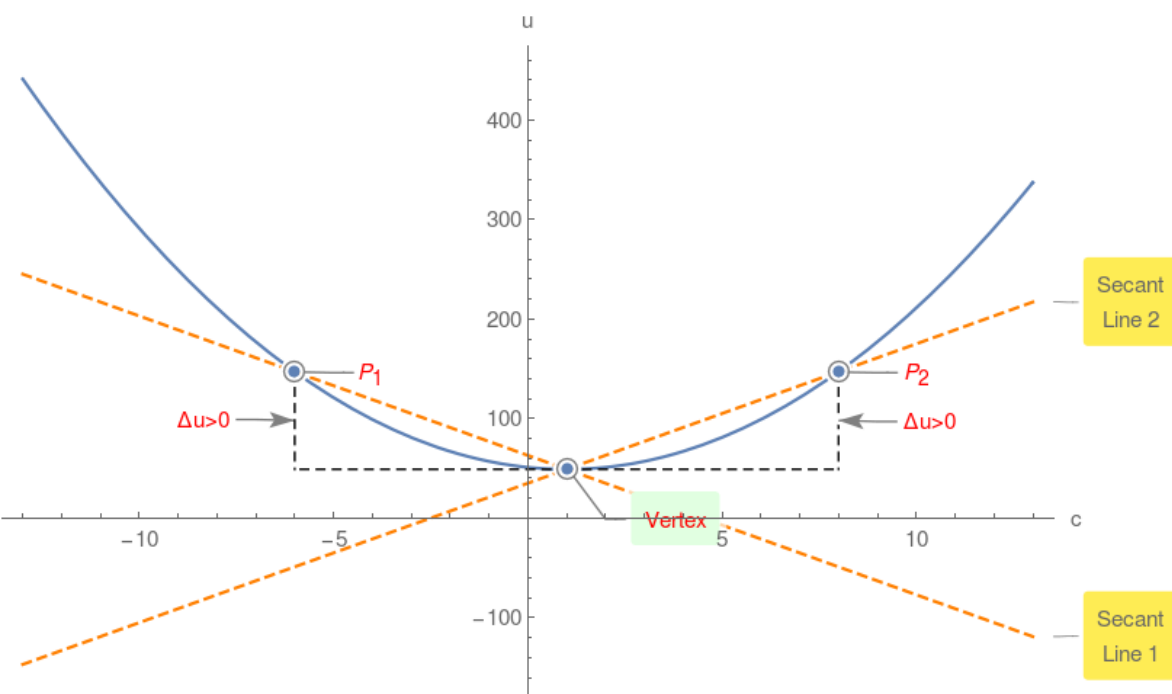
$$u(c_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = u(c_1+h) - u(c_1) = ah^2$$

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

### Example 1.

$$u(c) = 2c^2 - 4c + 51$$



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

### Example 2.

$$u(c) = -c^2 + 8c - 49$$

