

Vertex of the Quadratic

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

$$t_1 = -\frac{b}{2a} \text{ namely } u(t_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at t_1+h , namely

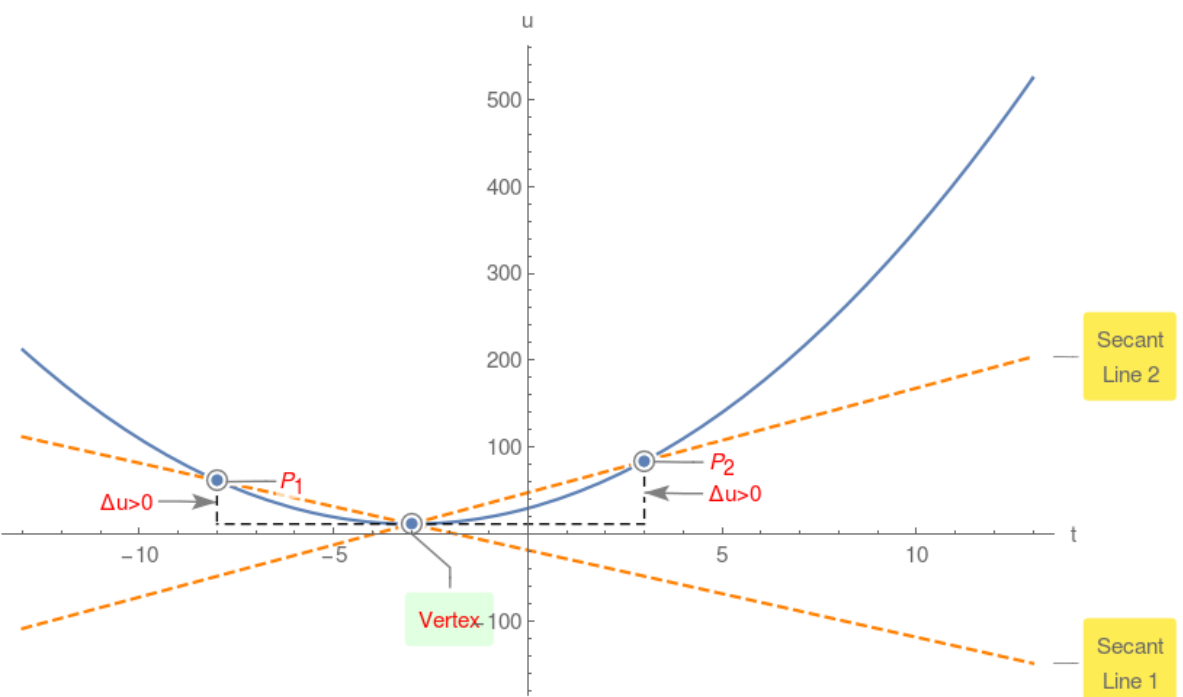
$$u(t_1+h) = -\frac{b^2}{4a} + ah^2 + c$$

$$\text{Compute } \Delta = u(t_1+h) - u(t_1) = ah^2$$

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

Example 1.

$$u(t) = 2t^2 + 12t + 30$$



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

Example 2.

$$u(t) = -4t^2 - 32t - 52$$

