

## Vertex of the Quadratic

Given a quadratic  $f(b) = a b^2 + b^2 + c$  compute its value at

$$b_1 = -\frac{b}{2a} \text{ namely } f(b_1) = c - \frac{b^2}{4a}$$

Now compute the same quadratic at  $b_1+h$ , namely

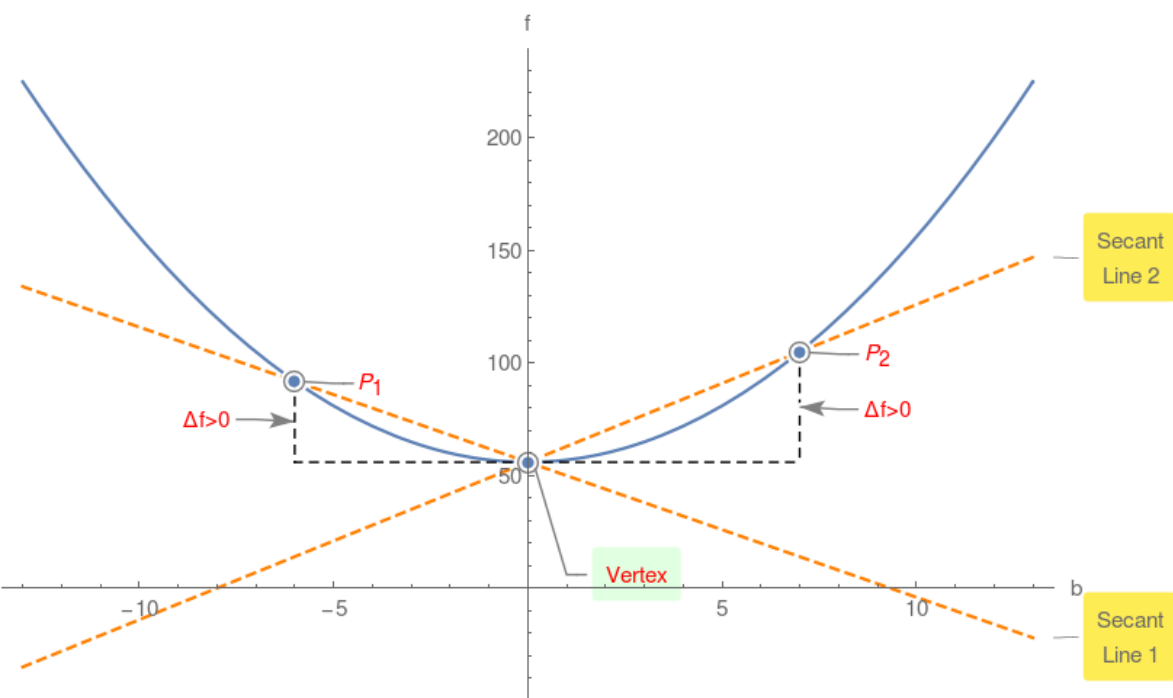
$$f(b_1+h) = -\frac{b^2}{4a} + a h^2 + c$$

$$\text{Compute } \Delta = f(b_1+h) - f(b_1) = a h^2$$

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

### Example 1.

$$f(b) = b^2 + 56$$



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

### Example 2.

$$f(b) = -b^2 + 4b - 66$$

