

## Parabola $\Delta$ (Delta)

$$y = ax^2 + bx + c$$

$$y = a \left[ \left( x + \frac{b}{2a} \right)^2 - \frac{\Delta}{4a^2} \right]$$

$$\Delta = b^2 - 4ac$$

When  $\Delta < 0$

$$\Delta \geq 0, \quad (b^2 - 4ac \geq 0)$$

$$y = a \cdot [ (+) - (-) ]$$

$$\text{if } a > 0 \Rightarrow y > 0$$

$$\text{if } a < 0 \Rightarrow y < 0$$

$$y = 0$$

$$\left( x + \frac{b}{2a} \right) = \frac{\Delta}{4a^2}$$

$$x + \frac{b}{2a} = \frac{\pm\sqrt{\Delta}}{2a}$$

$$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a}$$

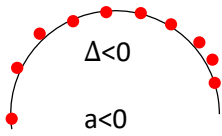
→ X

$$y = 2x^2 - x - 1$$

$a = 2 \quad b = -1 \quad c = -1$

$$x_{1,2} = \frac{+1 \pm \sqrt{1+8}}{4}$$

$$\begin{matrix} / & 1 \\ \backslash & -\frac{1}{2} \end{matrix}$$



$y < 0$  for all  $x$

example:  $y = -x^2 + 6x - 11$

$a = -1 \quad b = 6 \quad c = -11$

$$\Delta = 6^2 - 4(-1)(-11) < 0$$

$$Y(1) < 0, \quad Y(100) < 0$$

$$Y(0) < 0, \quad Y\left(\frac{1}{4}\right) < 0$$

