

2.2 Quadratic Functions - Parabolas 1

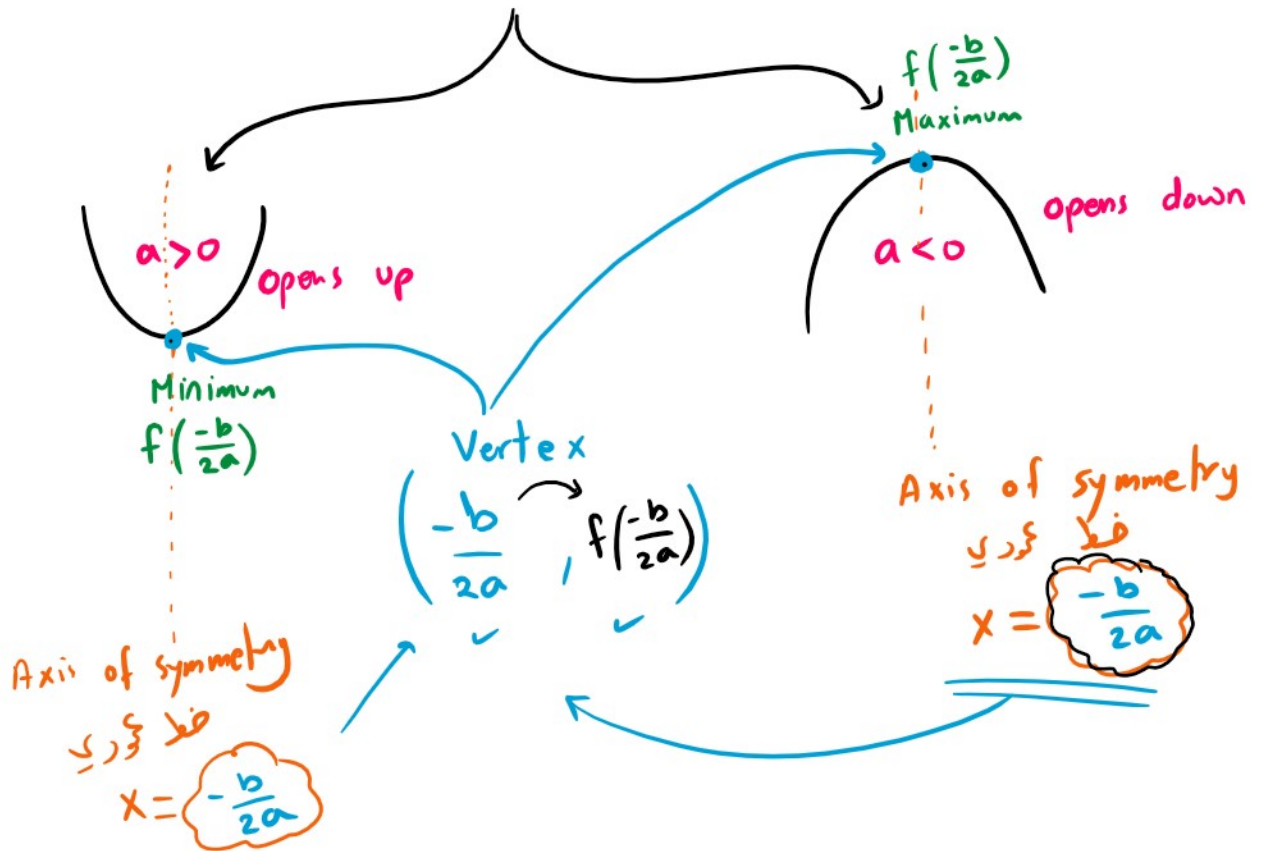
Tuesday, January 9, 2024 7:22 AM

الآن ان الزيد في
أفهم

$$y = ax + b \quad \text{linear function}$$

$$y = ax^2 + bx + c \quad \text{quadratic} \quad a \neq 0$$

Parabola



Def Optimum value $\begin{cases} \text{Maximum} \\ \text{Minimum} \end{cases}$ is the Vertex

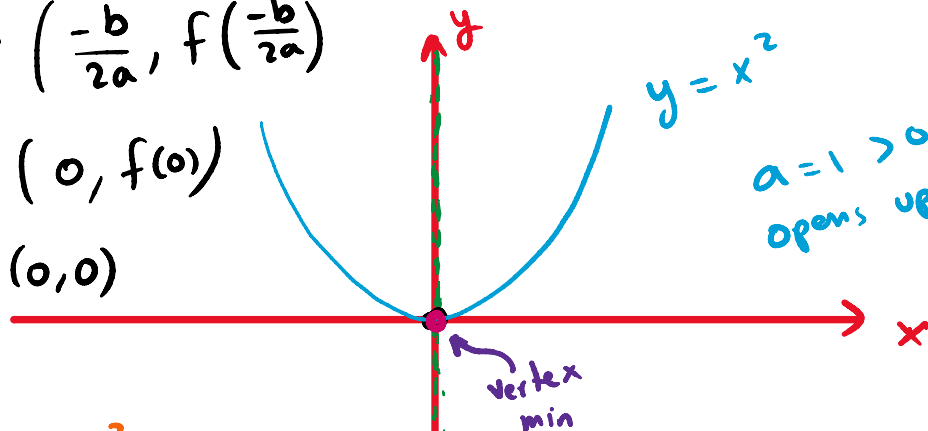
Exp $y = x^2$, $a = 1$, $b = 0$, $c = 0$

Exp $y = x^2$

① This parabola opens up since $a = 1 > 0$

② Axis of symmetry is $x = \frac{-b}{2a} = \frac{-0}{2(1)} = 0$
 $x = 0$ is y-axis
 محور التماثل

③ Vertex is $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$
 $= (0, f(0))$
 $= (0, 0)$



$$\begin{aligned}\Delta &= b^2 - 4ac \\ &= 0^2 - 4(1)(0) \\ &= 0 - 0 \\ &= 0\end{aligned}$$

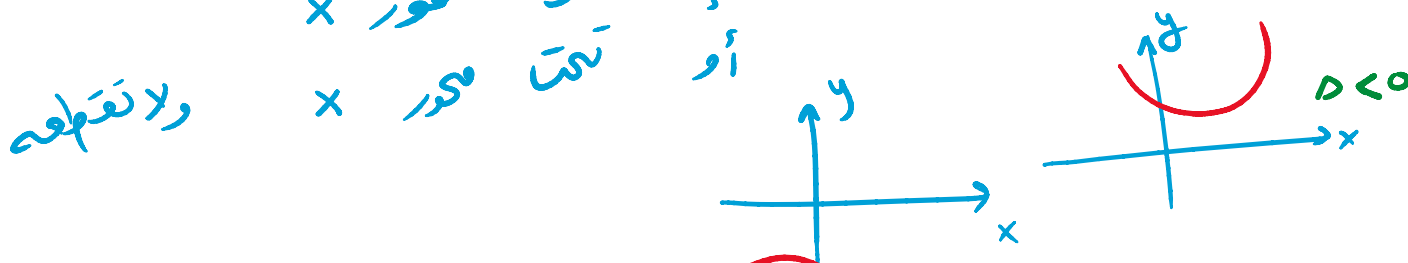
④ intercepts $y = x^2$

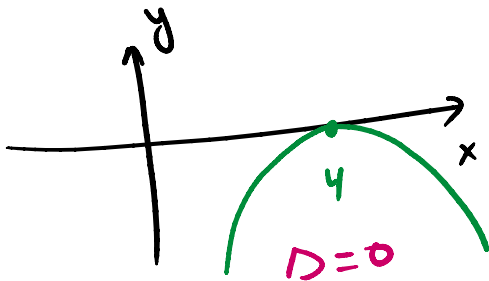
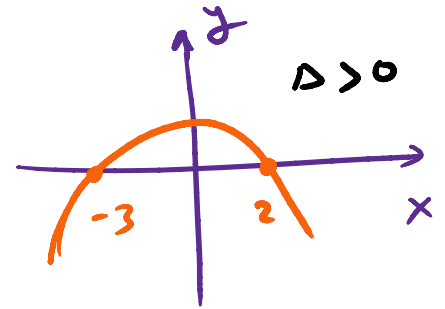
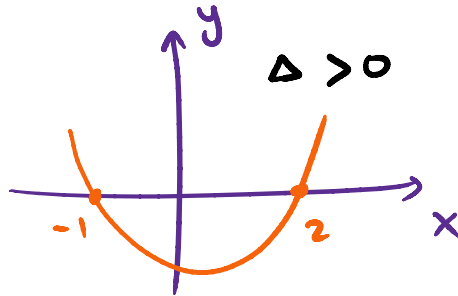
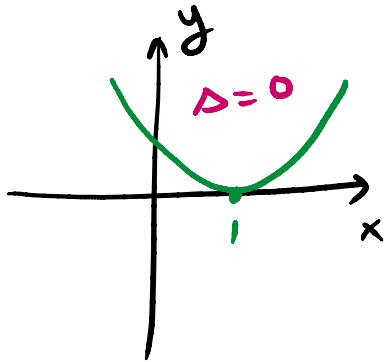
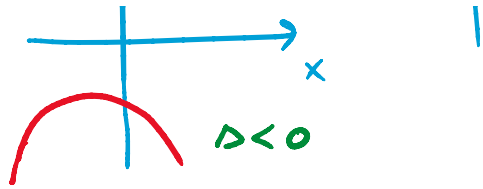
$$\begin{aligned}\text{x-intercept} &\Rightarrow y = 0 \Rightarrow x^2 = 0 \Rightarrow x = 0 \Rightarrow (0, 0) \\ \text{y-intercept} &\Rightarrow x = 0 \Rightarrow y = 0^2 \Rightarrow y = 0 \Rightarrow (0, 0) \\ &\quad x = 0\end{aligned}$$

AS : Axis of symmetry

⑤ sketch $y = x^2$

Remark • If $\Delta < 0$ then no x-intercept
 في هذه الحالة لن تكون الرقعة إما فوق محور x
 أو تحت محور x ولا تقاطعه





Ex $f(x) = y = -x^2 - 1$

$a = -1, b = 0, c = -1$

(1) This parabola opens down since $a = -1 < 0$

(2) AS $x = \frac{-b}{2a} = \frac{-(0)}{2(-1)} = 0$

(3) Vertex $\Rightarrow \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right) = (0, -1)$

$f(0) = -(0)^2 - 1$
 $= 0 - 1$
 $= -1$



