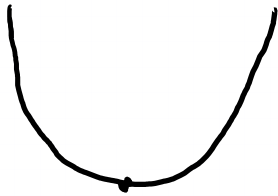
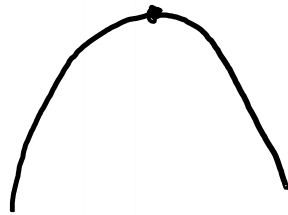


# Parabole

$$f(x) = ax^2 + bx + c$$



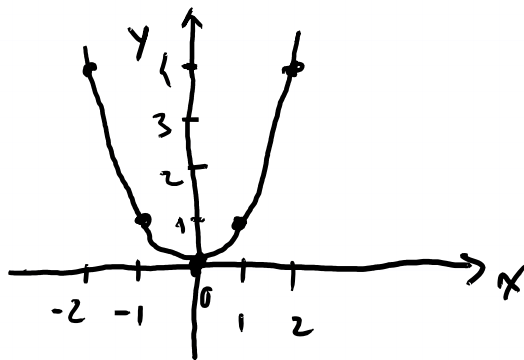
$$a > 0$$



$$a < 0$$

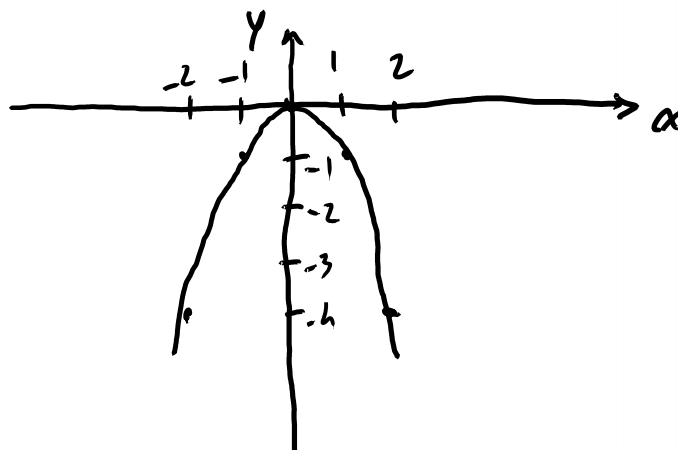
Example:

$$f(x) = x^2 \quad a = 1 \quad b = c = 0$$



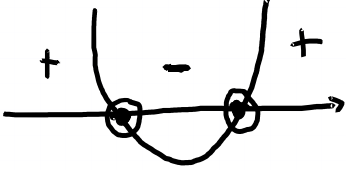
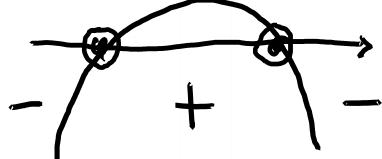
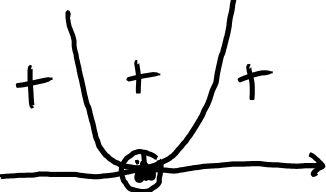

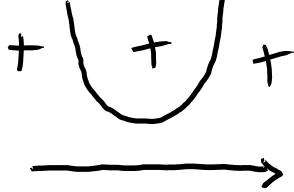
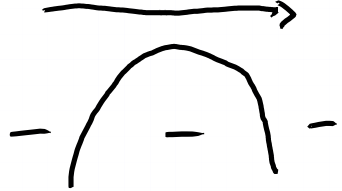
x	y
0	0
1	1
-1	1
2	4
-2	4

$$f(x) = -x^2 \quad a = -1 \quad b = c = 0$$



x	y
0	0
1	-1
-1	-1
2	-4
-2	-4

Déterminer la position de la parabole par rapport à l'axe des abscisses.

	$a > 0$	$a < 0$
$\Delta > 0$		
$\Delta = 0$		
$\Delta < 0$		

Ex 1 : Étudier le signe des expressions suivantes :

1)  $x^2 - 3x$       2)  $3x^2 - 12x$

3)  $-x + x^2 - 6$       4)  $x^2 - x + 1$

5)  $x^2 + 2x + 1$

$$1) \quad x^2 - 3x \quad (ax^2 + bx + c)$$

$$a = 1 \quad b = -3 \quad c = 0$$

$$a > 0 \Rightarrow \quad \cup$$

$$\Delta = b^2 - 4ac = (-3)^2 - 4 \times 1 \times 0 = 9$$

$$\Delta > 0 \Rightarrow \quad \cup$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-(-3) - \sqrt{9}}{2 \times 1} = \frac{3 - 3}{2} = 0$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{3 + 3}{2} = 3$$

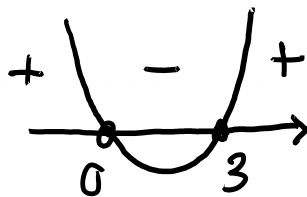


Tableau de signe:

$x$	$-\infty$	$0$	$3$	$+\infty$	
signe de $x^2 - 3x$	$+$	$0$	$-$	$0$	$+$

$$2) 3x^2 - 12x$$

$$a = 3 \quad b = -12 \quad c = 0$$

$$\Delta = (-12)^2 - 4 \times 3 \times 0 = 144$$



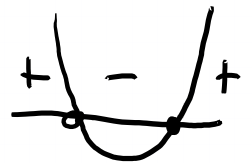
$$x_1 = \frac{12 - 12}{6} = 0 \quad x_2 = \frac{12 + 12}{6} = 4$$

$x$	$-\infty$	$0$	$4$	$+\infty$	
$3x^2 - 12x$	$+$	$\emptyset$	$-$	$\emptyset$	$+$

$$3) -x + x^2 - 6 = x^2 - x - 6$$

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

$$\Delta = (-1)^2 - 4 \times 1 \times (-6) = 1 + 24 = 25$$

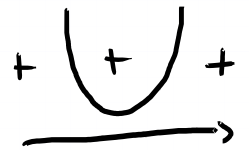


$$x_1 = \frac{1 - 5}{2} = -2 \quad x_2 = \frac{1 + 5}{2} = 3$$

$x$	$-\infty$	$-2$	$3$	$+\infty$	
$x^2 - x - 6$	$+$	$\emptyset$	$-$	$\emptyset$	$+$

$$4) \quad x^2 - x + 1 \quad a=1 \quad b=-1 \quad c=1$$

$$\Delta = (-1)^2 - 4 \times 1 \times 1 = 1 - 4 = -3$$



$x$	$-\infty$	$+\infty$
$x^2 - x + 1$	+	

$$5) \quad x^2 + 2x + 1 \quad a=1 \quad b=2 \quad c=1$$

$$\Delta = 2^2 - 4 \times 1 \times 1 = 4 - 4 = 0$$



$$x_1 = -\frac{b}{2a} = -\frac{2}{2} = -1$$

$x$	$-\infty$	$-1$	$+\infty$
$x^2 + 2x + 1$	+	$\emptyset$	+