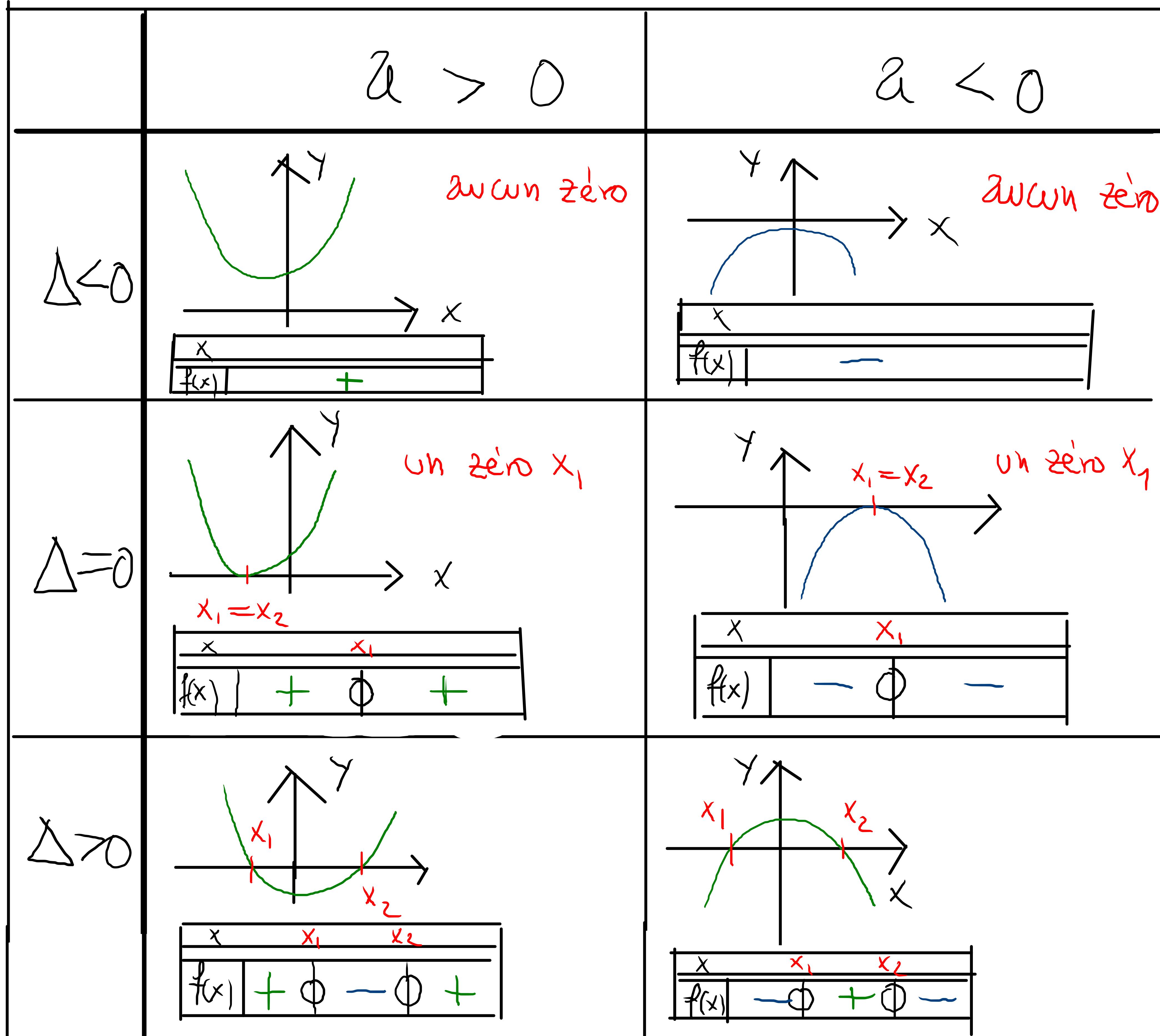


Fonction quadratique : résumé

$$f(x) = ax^2 + bx + c \quad \text{avec} \quad a \neq 0$$

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



convexe
"sourire"

concave
"grimace"

3.3.15 Dessiner les graphes des fonctions

$$f(x) = x^2 - x - 6 \text{ et } g(x) = -x^2 + 2x - 2$$

Résoudre ensuite les équations et inéquations ci-dessous.

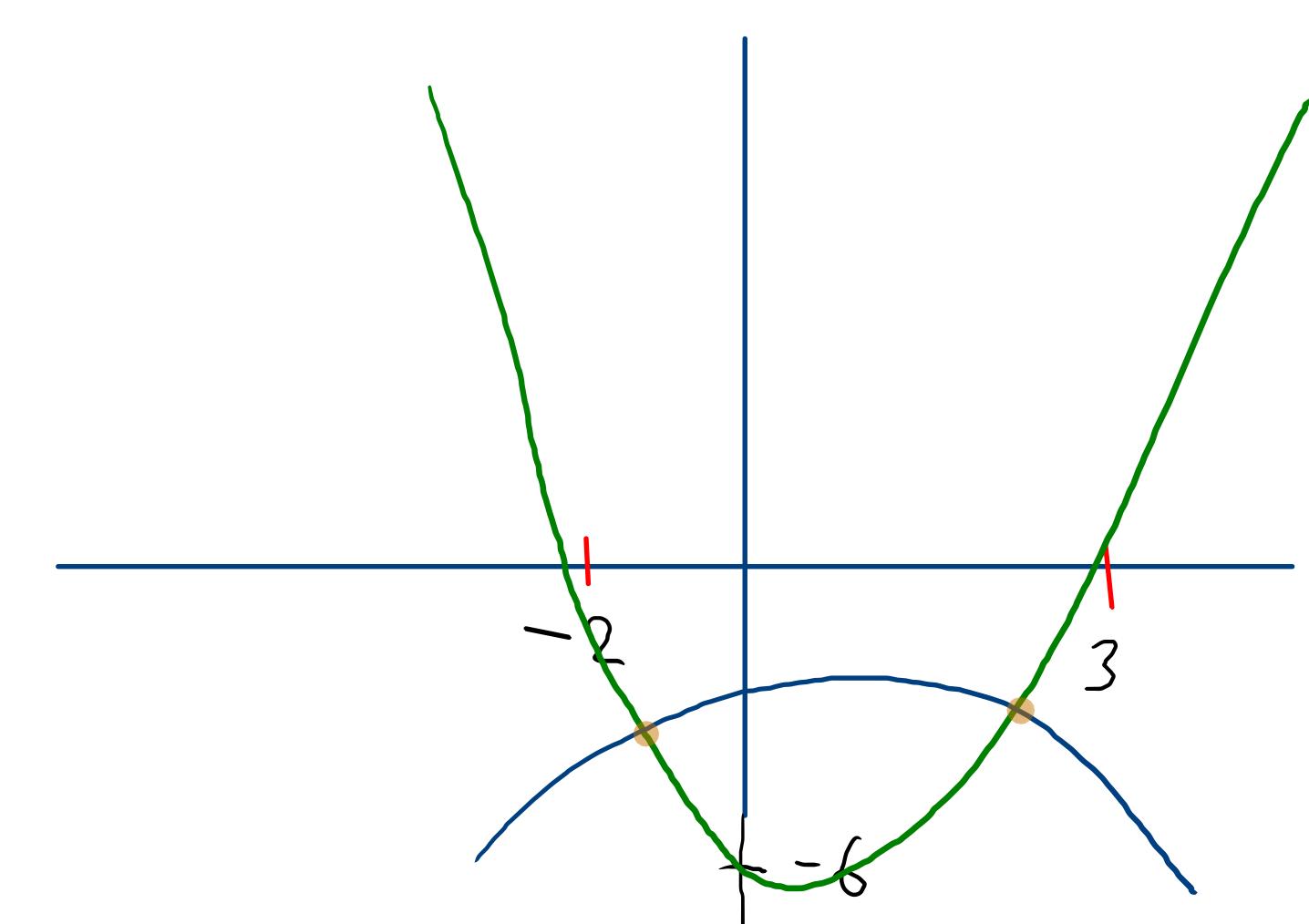
- | | |
|------------------|-------------------|
| a) $f(x) = 0$ | f) $g(x) \geq 0$ |
| b) $g(x) = 0$ | g) $g(x) \leq 0$ |
| c) $f(x) = g(x)$ | h) $f(x) < g(x)$ |
| d) $f(x) > 0$ | i) $g(x) \leq -2$ |
| e) $f(x) < 0$ | |

$$f(x) = x^2 - x - 6 \text{ convexe "sourire"}$$

$$\Delta = 1 + 24 = 25 = 5^2$$

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

x	-2	3
f(x)	+	-



$$g(x) = -x^2 + 2x - 2 \text{ concave "grinche"}$$

$$\begin{aligned}\Delta &= 4 - 4 \cdot (-1) \cdot (-2) \\ &= 4 - 8 = -4 < 0\end{aligned}$$

x	
g(x)	—

a) $f(x) = 0 \Leftrightarrow x = -2; x_2 = 3$

b) $g(x) = 0$ impossible

c) $f(x) = g(x) \Leftrightarrow x^2 - x - 6 = -x^2 + 2x - 2$
 $2x^2 - 3x - 4 = 0$
 $\Delta = (-3)^2 - 4 \cdot 2 \cdot (-4) = 9 + 32 = 41$

$$x_1 = \frac{3-\sqrt{41}}{4} \approx -1,4; \quad x_2 = \frac{3+\sqrt{41}}{4} \approx 2,4$$

d) $f(x) > 0 \Leftrightarrow x \in]-\infty; -2] \cup [3; +\infty[$

e) $g(x) < -2 \Leftrightarrow -x^2 + 2x - 2 < -2$

$$\underbrace{-x^2 + 2x}_{h(x)} < 0$$

$$h(x) = -x^2 + 2x = x(-x+2)$$

$$\begin{array}{c} \downarrow \quad \downarrow \\ 0 \quad 2 \end{array}$$

x	0	2
h(x)	-	+

$$g(x) < -2 \Leftrightarrow h(x) < 0 \Leftrightarrow x \in]-\infty; 0[\cup [2; +\infty[$$