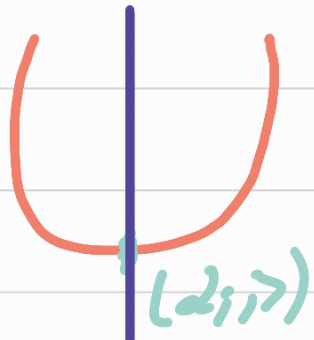
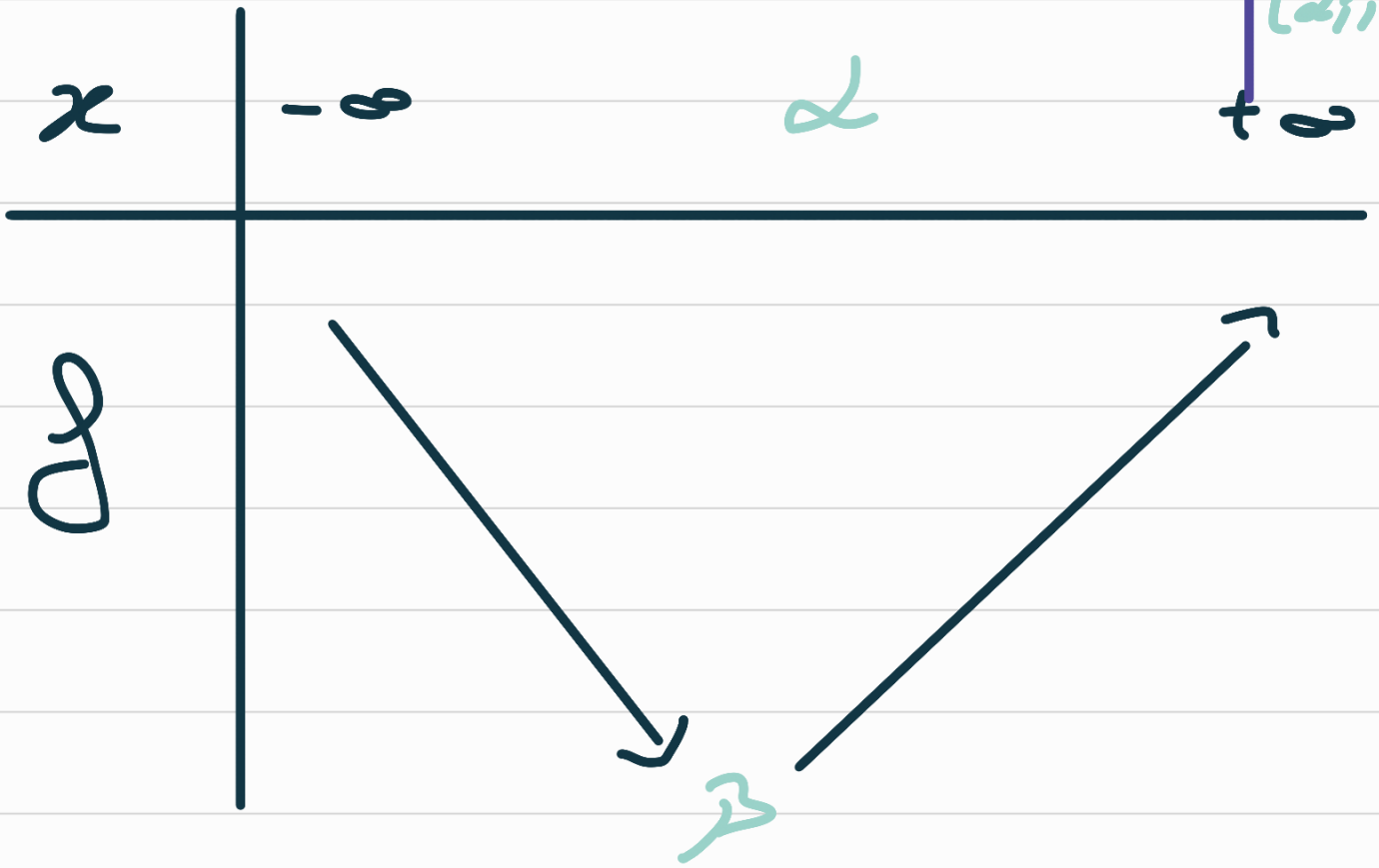
Second degré

• Variations

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

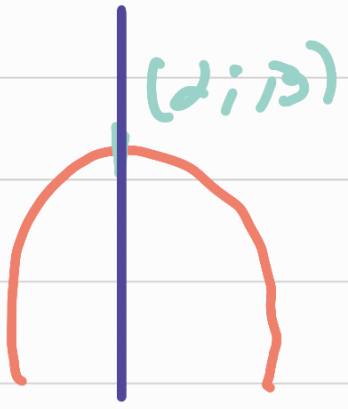
-> si $a > 0$:





=> $(\alpha ; \beta)$ est le minimum de f.

$$\alpha = -\frac{b}{2a} \quad \text{et} \quad \beta = f(\alpha)$$



→ si $a < 0$:

x	$-\infty$	α	$+\infty$
f	↗	β	↘

⇒ $(\alpha;\beta)$ est le maximum de f.

exercice 73 : $f(x) = ax^2 + bx + c$

- $f(0) = -10$

-

x	$-\infty$		-3		$+\infty$
f		↗	-5	↘	

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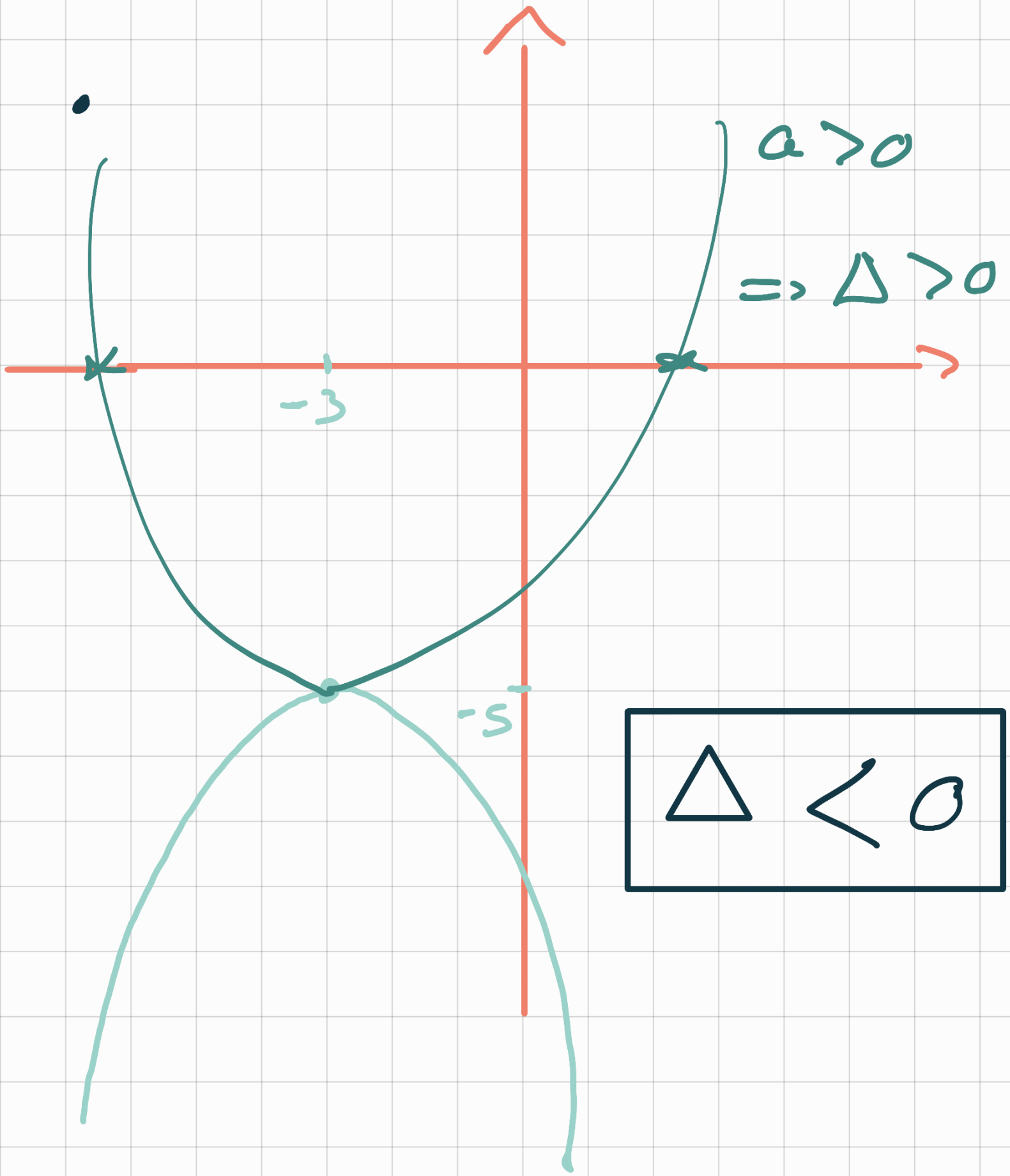
1)

- $a < 0$

- $f(0) = a \times 0^2 + b \times 0 + c = c$

donc $\boxed{c = -10}$



$$\Delta < 0$$

2) $f(x) = a(x-2)^2 + \beta$

$f(x) = a(x+3)^2 - 5$

3) a) $f(0) = \boxed{-10}$

or $f(0) = a(0+3)^2 - 5$

$= \boxed{a \times 9 - 5}$

donc $9a - 5 = -10$

$9a = -10 + 5 = -5$

$a = -\frac{5}{9}$.

5) $f(x) = -\frac{5}{9}x^2 + bx - 10$

$$\alpha = -\frac{b}{a}$$

$$-3 = \frac{-b}{-\frac{5}{9}}$$

$$-3x - \frac{5}{9} = -b$$

$$\frac{-3x-5}{9} = -b$$

$$\frac{-3x-5}{3x3} = -b$$

$$\frac{5}{3} = -b \Rightarrow \boxed{b = -\frac{5}{3}}$$

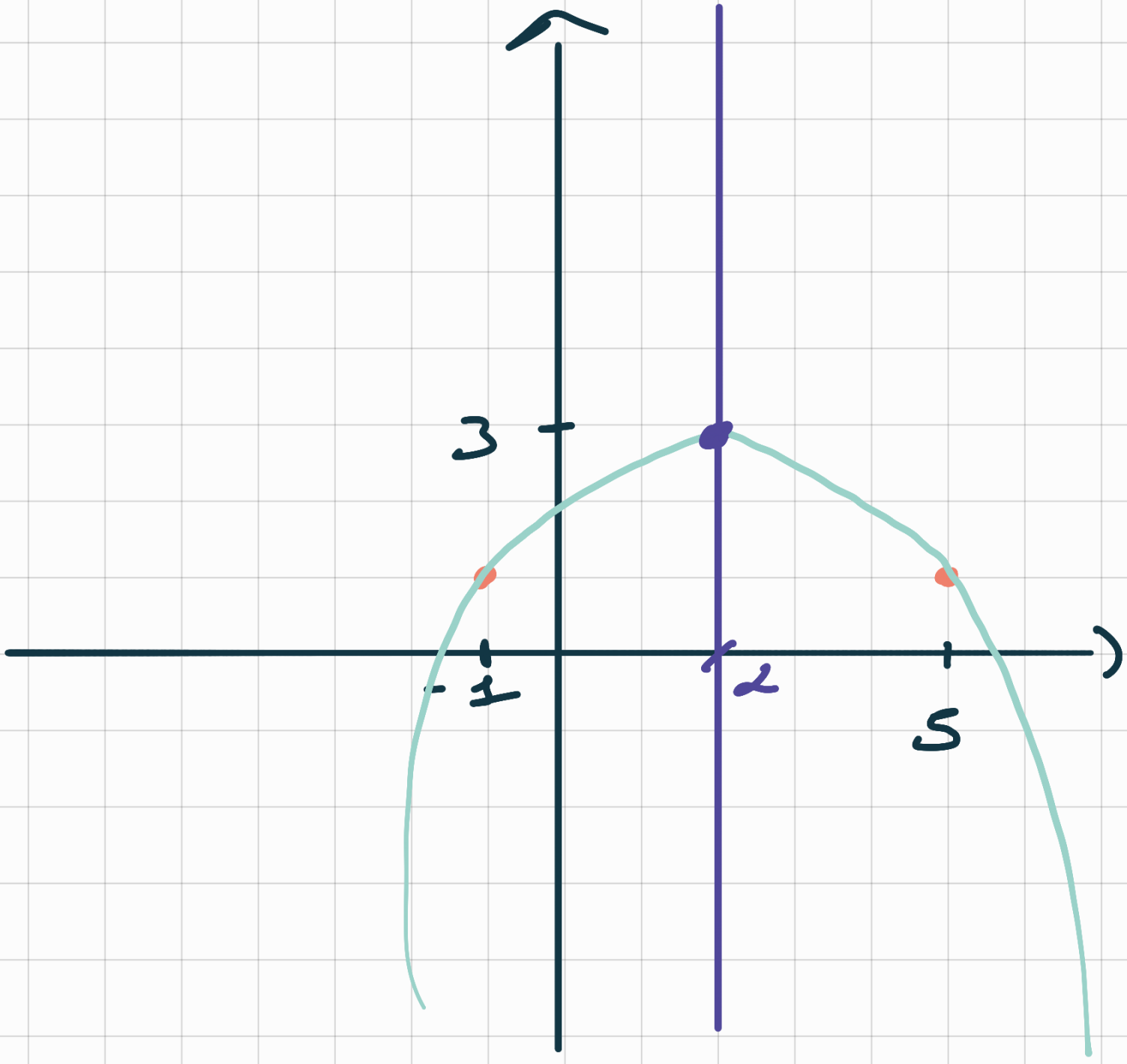
exercice 32 :

1)

x	-1		2		5
g	1	↗	3	↘	1

$$\alpha = \frac{-1+5}{2} = \frac{4}{2} = 2$$

L'axe de symétrie est la droite d'équation $x = 2$


3
-1
2
5

2) $g(x) = a(x-2)^2 + 3$.

- $g(-1) = \boxed{1}$

- $g(-1) = a(-1-2)^2 + 3$

$= a(-3)^2 + 3$

$= \boxed{9a + 3}$

$9a + 3 = 1 \iff 9a = 1-3$

$\iff 9a = -2$

$\iff a = -\frac{2}{9}$.

donc $g(x) = -\frac{2}{9}(x-2)^2 + 3$.

3) $g(x) = -\frac{2}{9}(x-2)^2 + 3$

$= -\frac{2}{9}(x^2 - 4x + 4) + 3$

$= -\frac{2}{9}x^2 - \frac{2}{9}x - 4x - \frac{2}{9}x4 + 3$

$= -\frac{2}{9}x^2 + \frac{8}{9}x - \frac{8}{9} + \frac{3}{1}$ (9x, 9x1)

$= -\frac{2}{9}x^2 + \frac{8}{9}x - \frac{8}{9} + \frac{3x9}{9}$

$= -\frac{2}{9}x^2 + \frac{8}{9}x + \frac{19}{9}$