

Tableau de variations

Prop: si $f' > 0$, alors la fonction f est croissante

si $f' \leq 0$, alors la fonction f est décroissante.

exercice :

$$f(x) = -2x^3 + 3x^2 - 5x + 1.$$

- 1) Dériver la fonction
 - 2) Tableau de signes de la dérivée
 - 3) En déduire le tableau de variations.
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$$f'(x) = -6x^2 + 6x - 5.$$

$$\begin{aligned}\Delta &= b^2 - 4ac = 6^2 - 4 \times -6 \times -5 \\ &= -84 < 0\end{aligned}$$



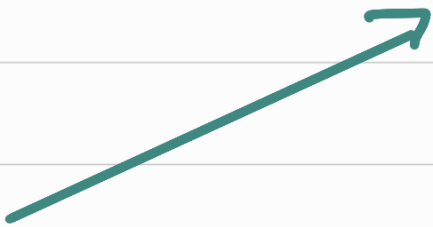
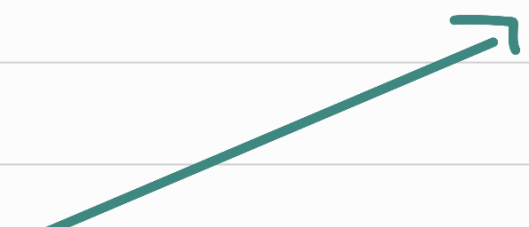
exercice :

$$f(x) = \frac{2x-1}{3x+2},$$

pour $x \in \mathbb{R} \setminus \{-\frac{2}{3}\}$.

$$f'(x) = \frac{2(3x+2) - 3(2x-1)}{(3x+2)^2}$$

$$= \frac{7}{(3x+2)^2} > 0$$

x	$-\infty$	$-\frac{2}{3}$	$+\infty$
f'	+		+
f			

exercice :

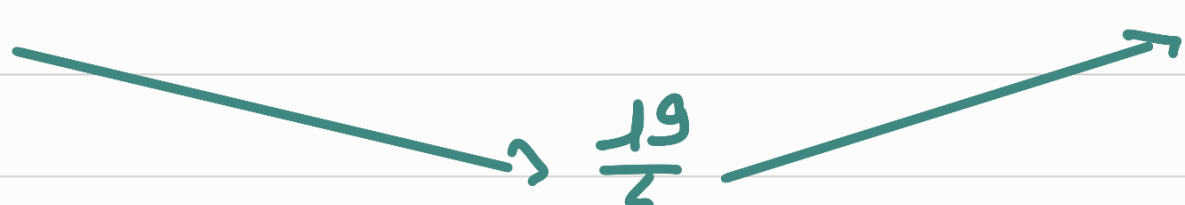
$$f(x) = x^2 + 3x + 7$$

$$f'(x) = \underline{2}x + \underline{3}$$

$$\bullet \quad 2x + 3 = 0$$

$$\Leftrightarrow 2x = -3$$

$$\Leftrightarrow x = -\frac{3}{2}$$

x	$-\infty$	$-\frac{3}{2}$	$+\infty$
f'	$-$	$\emptyset$	$+$
f			

$$ax + b$$

$$a > 0$$

$$a < 0$$

x	$-\infty$	$-\frac{b}{a}$	$+\infty$
sign	$-$	$\bigcirc$	$+$

x	$-\infty$	$-\frac{b}{a}$	$+\infty$
sign	$+$	$\bigcirc$	$-$

exercice :

$$f(x) = \frac{2x + 5}{x^2 + x + 3}, \quad x \in \mathbb{R}$$

$$f'(x) = \frac{2(x^2 + x + 3) - (2x + 5)(2x + 1)}{(x^2 + x + 3)^2}$$

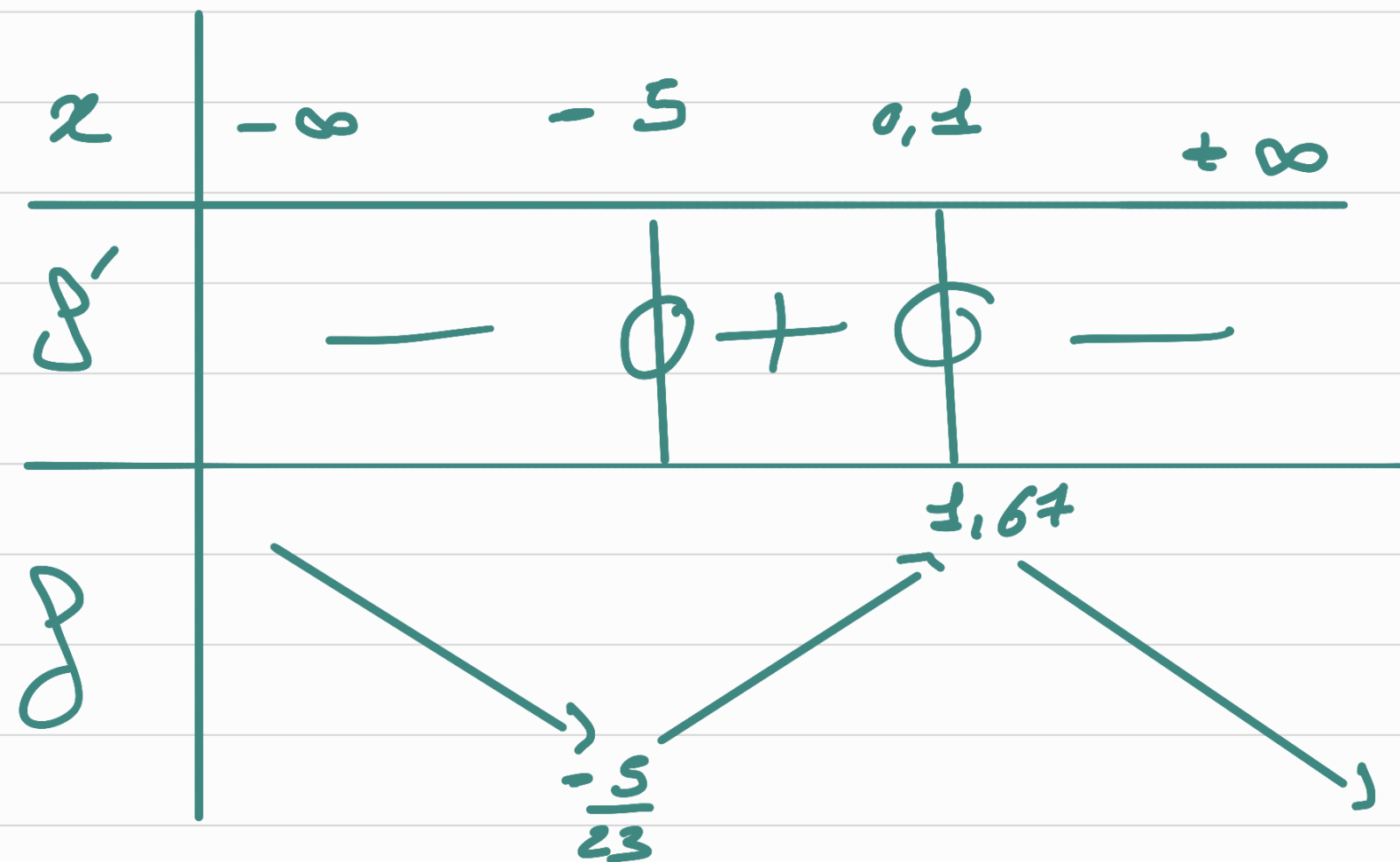
$$= \frac{2x^2 + 2x + 6 - 4x^2 - 2x - 10x - 5}{(x^2 + x + 3)^2}$$

$$= \frac{-2x^2 - 10x + 1}{(x^2 + x + 3)^2}$$

$$\Delta = b^2 - 4ac = 108 > 0$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a} \approx 0,1$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a} \approx -5.$$



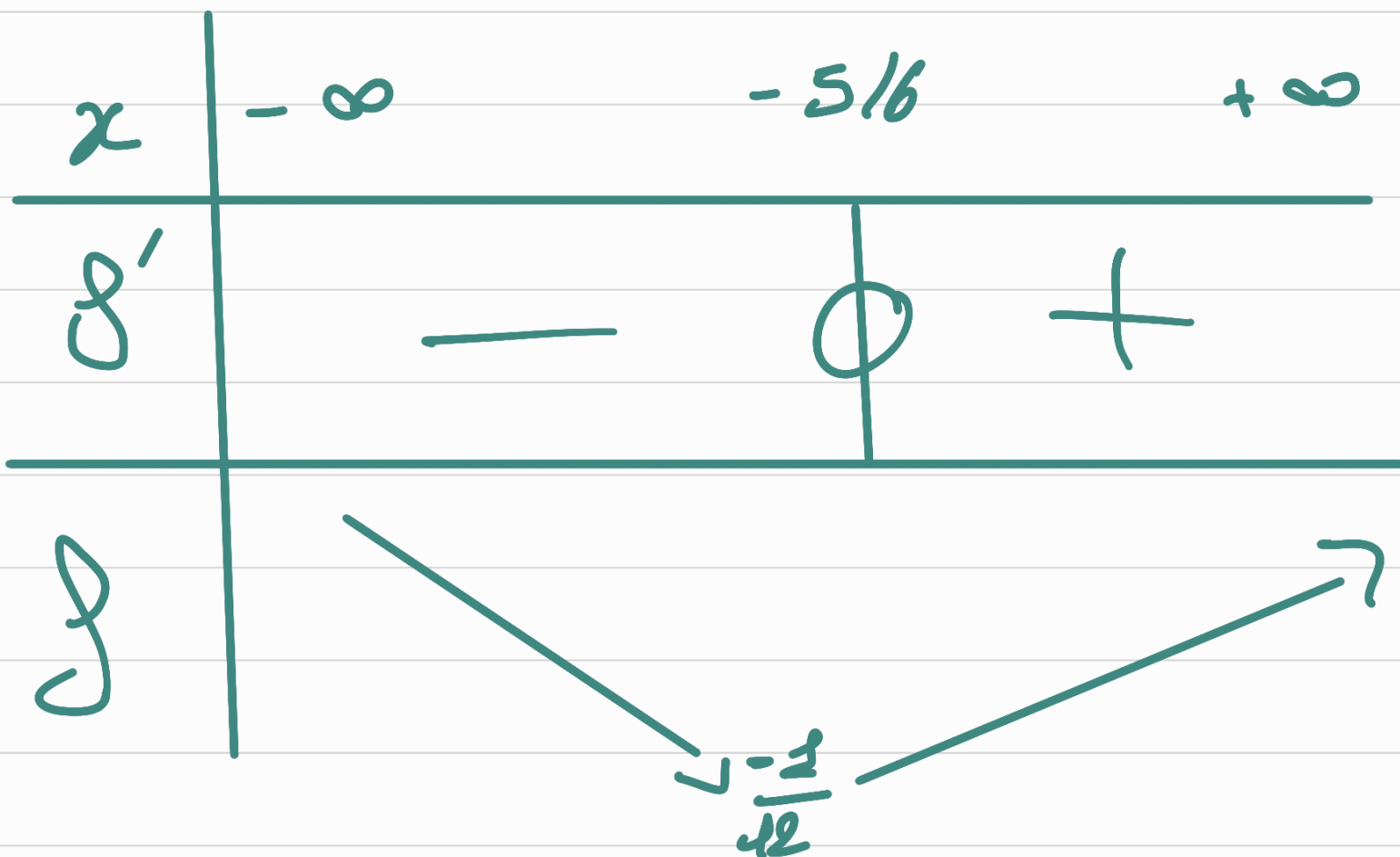
exercice :

$$f(x) = (x+1)(3x+2).$$

$$f'(x) = 1 \times (3x+2) + 3(x+1)$$

$$= 3x + 2 + 3x + 3$$

$$= 6x + 5.$$



exercice :

$$f(x) = x^3 - 3x + 1.$$

$$f'(x) = \underbrace{3}_{a} x^2 - \underbrace{3}_{c} \quad b=0$$

$$\Delta = 36 > 0$$

$$x_1 = -1 \quad \text{et} \quad x_2 = 1$$

x	$-\infty$	-1	1	$+\infty$
f'	$+$	ϕ	ϕ	$+$
f		$\nearrow 3$	$\searrow -1$	$\nearrow$

exercice :

$$f(x) = \frac{2x^2 - 3}{x^2 + 7}, \quad x \in \mathbb{R}$$

$$f'(x) = \frac{4x(x^2 + 7) - 2x(2x^2 - 3)}{(x^2 + 7)^2}$$

$$= \frac{4x^3 + 28x - 4x^3 + 6x}{(x^2 + 7)^2}$$

$$= \frac{34x}{(x^2 + 7)^2}$$

$$34x = 0 \quad \Leftrightarrow \quad x = \frac{0}{34} = 0$$

