

Derivation

exercice :

$$\bullet f(x) = 5x^3 - 2x^2 + 4x + 5$$

$$\hookrightarrow f'(x) = 5 \times 3x^2 - 2 \times 2x + 4$$

$$= 15x^2 - 4x + 4$$

$$\bullet f(x) = \sqrt{x} + \frac{4}{x}$$

$$\hookrightarrow f'(x) = \frac{1}{2\sqrt{x}} - \frac{4}{x^2}$$

$$\bullet f(x) = \sqrt{3x+5}$$

$$\hookrightarrow f'(x) = \frac{3}{2\sqrt{3x+5}}$$

$$\bullet f(x) = (4x-2)^2$$

$$\begin{aligned} \hookrightarrow f'(x) &= 2(4x-2) \times 4 \\ &= 8(4x-2) \end{aligned}$$

$$\bullet f(x) = \frac{1}{2x-1}$$

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

$$f(x) = (4x-6)(3x+2)$$

$u' = 4$

$v' = 3$

$$\begin{aligned} f'(x) &= 4(3x+2) + (4x-6) \times 3 \\ &= 12x + 8 + 12x - 18 \\ &= 24x - 10 \end{aligned}$$

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

$u' = 2x$

$v' = 1$

$$\begin{aligned} f'(x) &= \frac{2x(x-3) - (x^2-1) \times 1}{(x-3)^2} \\ &= \frac{2x^2 - 6x - x^2 + 1}{(x-3)^2} \end{aligned}$$

$$= \frac{x^2 - 6x + 1}{(x-3)^2}.$$

exercice :

$$f(x) = x^3 + 9x^2 - 21x + 4$$

1) Déterminer la dérivée.

$$f'(x) = 3x^2 + 9 \times 2x - 21$$

$$= \underset{a}{3}x^2 + 18x - 21.$$

2) Construire le tableau de signe de f' .

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

$$= 18^2 - 4 \times 3 \times -21$$

$$= 576 > 0$$

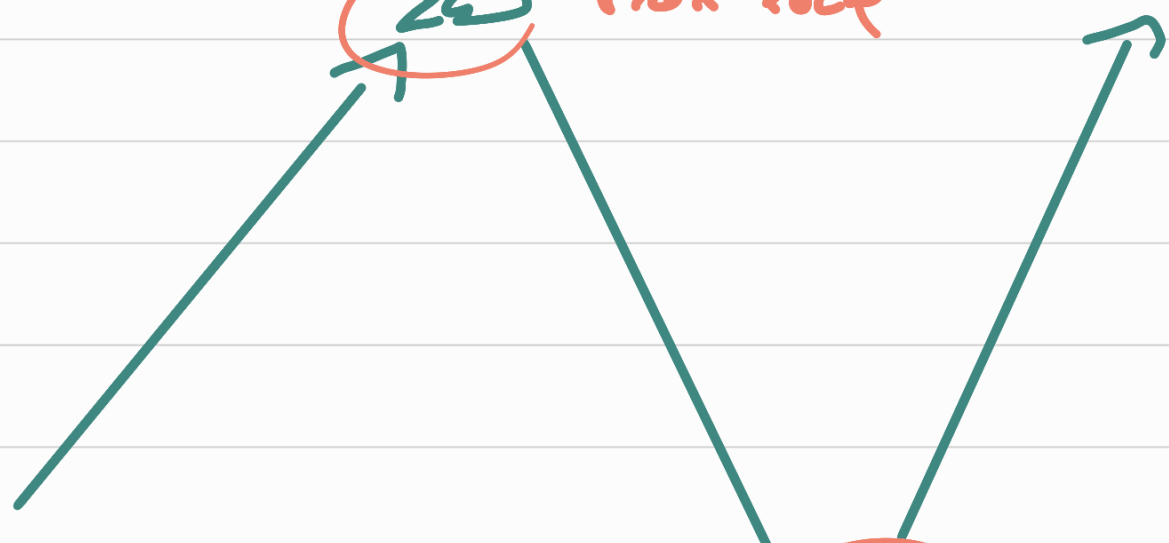
$$x_1 = \frac{-3 - \sqrt{\Delta}}{2a} = \frac{-18 - \sqrt{576}}{2 \times 3} = -7$$

$$x_2 = \frac{-3 + \sqrt{\Delta}}{2a} = \frac{-18 + \sqrt{576}}{2 \times 3} = 1.$$

x	$-\infty$	-7	1	$+\infty$
signe de g'	+	○ — ○	+	+
	signe a	signe $-a$		signe a

3) Tableau de variation,

x	$-\infty$	-7	1	$+\infty$	
f'	$+$	0	$-$	0	$+$
f		249 max local		-7 min local	



exercice :

$$h(x) = \underbrace{(x-2)}_{u'=1} \underbrace{(x-1)^3}_{v'=3(x-1)^2 \times 1}$$

1) a) $h'(x) = 1 \times (x-1)^3 + (x-2) \times 3(x-1)^2$

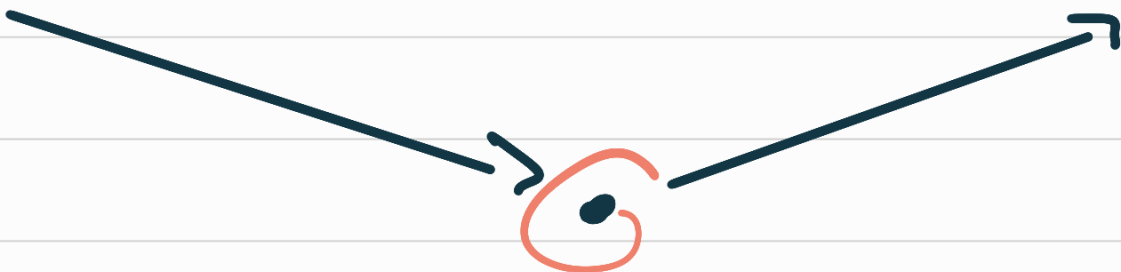
$$= (x-1)^2 [(x-1) + 3(x-2)]$$

$$= (x-1)^2 (x-1 + 3x-6)$$

$$= \underbrace{(x-1)^2}_{>0} \underbrace{(4x-7)}$$

x	$-\infty$	$7/4$	$+\infty$
$4x-5$	-	ϕ	+

x	$-\infty$	$7/4$	$+\infty$
$(x-1)^2$	+	$\vdots$	+
$4x-7$	-	$\bigcirc$	+
f'	-	$\bigcirc$	+
f			



 , minimum local.

$$ax + b$$

$$a > 0$$

x	$-\infty$	$-b/a$	$+\infty$
signe	-	$\emptyset$	+

$$a < 0$$

x	$-\infty$	$-b/a$	$+\infty$
signe	+	$\emptyset$	-

$$\Delta > 0 :$$

x	$-\infty$	x_1	x_2	$+\infty$	
signe ax^2+bx+c	signe a	$\emptyset$	signe $-a$	$\emptyset$	signe a

$$\underline{\Delta = 0 :}$$

x	$-\infty$	x_0	$+\infty$
		$\swarrow -b/2a$	
signe ax^2+bx+c	signe a	0	signe c

$$\underline{\Delta < 0 :}$$

x	$-\infty$	$+\infty$
signe ax^2+bx+c	signe de a	

exercice:

$$f(x) = \frac{3x-2}{2x-1} \Rightarrow x = 1/2$$

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

$$= \frac{3x - 3 - 6x + 4}{(2x-1)^2}$$

$$= \frac{-3x + 1}{(2x-1)^2} \rightarrow \underline{ax+b}$$

x	$-\infty$	$1/3$	$1/2$	$+\infty$
f'	+	0	-	-
f	