

Correction DST TS1 Octobre


Ex 1:

1. $4x - 21 + x^2 \leq 0$

$$x^2 + 4x - 21 \leq 0$$

$$a = 1 \quad b = 4 \quad c = -21$$

$$\begin{aligned} \Delta &= b^2 - 4ac = 4^2 - 4 \times 1 \times (-21) = \\ &= 16 + 84 = 100 \end{aligned}$$

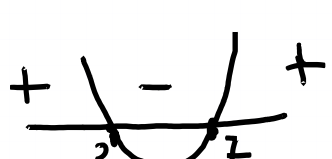
$$a > 0 ; \Delta > 0 \Rightarrow$$


$$x_1 = \frac{-b + \sqrt{\Delta}}{2a}$$

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

$$= \frac{-4 + 10}{2} = 3$$

$$= \frac{-4 - 10}{2} = -7$$


$$\Rightarrow S = [3; 7] \quad \boxed{b)}$$

2. $(3-x)(-x^2 + 5x - 4) \leq 0$

Étude de signe:

⊕
↓
se passe
de 3

$$3 - x > 0$$

$$-x > -3$$

$$x < 3$$

$$-x^2 + 5x - 4 > 0$$

$$\begin{aligned} a &= -1 \quad \Delta = 25 - 4 \times (-1) \times (-4) = \\ &= 25 - 16 = 9 \end{aligned}$$

$$x_1 = \frac{-5 + 3}{-2} = 1 \quad x_2 = \frac{-5 - 3}{-2} = 4$$

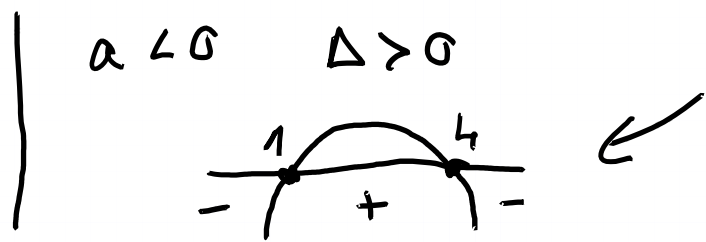


Tableau de signe

x	$-\infty$	1	3	4	$+\infty$
$3-x$		+	\emptyset	-	
$-x^2+5x-4$	-	\emptyset	+	\emptyset	-
P_f	-	\emptyset	+	\emptyset	-
		↑	↑	↑	↑

$$S =]-\infty; 1] \cup [3; 4] \quad \boxed{2)}$$

$$3. \quad 2x^4 - 19x^2 + 9 = 0$$

Changement de variable

$$X = x^2 \Rightarrow X^2 = x^4 ; X \geq 0$$

$$2X^2 - 19X + 9 = 0$$

$$\Delta = (-19)^2 - 4 \times 2 \times 9 = 289$$

$$X_1 = \frac{19 + 17}{4} = 9$$

$$X_2 = \frac{19 - 17}{4} = \frac{1}{2}$$

$$x^2 = 9 \Rightarrow x = \pm 3$$

$$x^2 = \frac{1}{2} \Rightarrow x = \pm \frac{1}{\sqrt{2}}$$

$$S = \left\{ -3; -\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}; 3 \right\} \quad \boxed{b)}$$

$$4. \quad \frac{x}{x-2} \leq \frac{6}{x-1}$$

Ensemble de définition:

$$x-2=0 \Leftrightarrow x=2 \quad \forall I.$$

$$x-1=0 \Leftrightarrow x=1 \quad \forall I.$$

$$D = \mathbb{R} \setminus \{1; 2\}$$

$$\frac{x}{x-2} - \frac{6}{x-1} \leq 0$$

$$\frac{x(x-1) - 6(x-2)}{(x-2)(x-1)} \leq 0$$

$$\frac{x^2 - x - 6x + 12}{(x-2)(x-1)} \leq 0$$

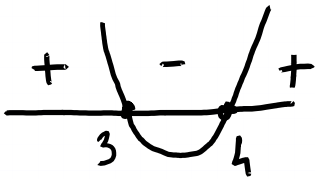
$$\frac{x^2 - 7x + 12}{(x-2)(x-1)} \leq 0$$

Étude de signe

$$x^2 - 7x + 12 > 0$$

$$\Delta = 49 - 4 \times 1 \times 12 = 49 - 48 = 1$$

$$x_1 = \frac{7+1}{2} = 4 \quad x_2 = \frac{7-1}{2} = 3$$



$$x - 2 > 0$$

$$x > 2$$

V.I.

$$x - 1 > 0$$

$$x > 1$$

V.I.

Tableau de signe

x	$-\infty$	1	2	3	4	$+\infty$			
$x^2 - 7x + 12$		+		○	-	○	+		
$x - 2$		-	○		+				
$x - 1$	-	○		+					
P.r	+		-		+	○	-	○	+

$$S =]1; 2[\cup [3; 4]$$

c)

Ex 2 :

1. $f(2)=3$ et $f(4)=-7$

fonction affine $\Rightarrow f(x)=ax+b$

$$f(2) = 2a + b = 3 \Leftrightarrow b = 3 - 2a$$

$$f(4) = 4a + b = -7$$

$$4a + 3 - 2a = -7$$

$$2a = -10 \Leftrightarrow a = -5$$

$$\Rightarrow b = 3 - 2 \times (-5) = 3 + 10 = 13$$

$$f(x) = -5x + 13 \quad \boxed{a)}$$

ou : $f(2)=3$ $f(4)=-7$

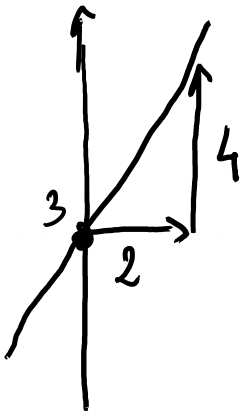
$$a = \frac{f(4) - f(2)}{4 - 2} = \frac{-7 - 3}{2} = \frac{-10}{2} = -5$$

$$f(x) = -5x + b$$

$$f(2) = -5 \times 2 + b = 3$$

$$b = 3 + 10 = 13$$

2.



$$\Rightarrow a = \frac{4}{2} = 2$$

$$\Rightarrow b = 3$$

c)