

$$f(x) = \frac{4x}{(x-2)(x-1)}$$

$$D_f = \{x/x \in \mathbb{R} \mid (x-2)(x-1) \neq 0\}$$

$$(x-2)(x-1) = 0 \rightarrow \begin{cases} x-2=0 \\ x-1=0 \end{cases} \rightarrow \begin{cases} x=2 \\ x=1 \end{cases}$$

$$D_f = \mathbb{R} - \{1, 2\} \quad (0,5)$$

$$f(x) = \sqrt{-x+5} + \frac{2}{x^2-4}$$

$$D_f = \{x/x \in \mathbb{R} : x^2-4 \neq 0 \text{ و } -x+5 \geq 0\}$$

$$x^2-4=0 \rightarrow x^2=4 \rightarrow x=\pm 2$$

$$D_1 = \mathbb{R} - \{-2, 2\} =]-\infty, -2[\cup]2, +\infty[$$

$$-x+5 \geq 0 \rightarrow -x \geq -5 \rightarrow x \leq \frac{-5}{-1}$$

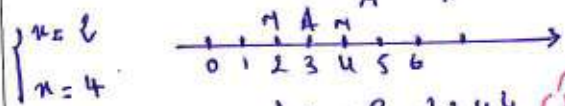
$$x \leq 5 \quad D_2 =]-\infty, 5]$$

$$D_f = D_1 \cap D_2 : x \in]-\infty, -2[\cup]2, 5]$$

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

$$D_f = \{x/x \in \mathbb{R} : |x-3|-1 \neq 0\}$$

$$|x-3|-1=0 \rightarrow |x-3|=1 \rightarrow MA=1$$



$$D_f = \mathbb{R} - \{2, 4\} \quad (1)$$

$$f(x) = \sqrt{|x+2|-1}$$

$$D_f = \{x/x \in \mathbb{R} : |x+2|-1 \geq 0\}$$

$$|x+2|-1 \geq 0 \rightarrow |x+2| \geq 1$$

$$|x-(-2)| \geq 1$$

$$x \in]-\infty, -3] \cup [-1, +\infty[\quad (1)$$

$$(\sqrt{x} - \sqrt{y})^2 = \sqrt{x}^2 + \sqrt{y}^2 - 2\sqrt{x}\sqrt{y}$$

$$= \sqrt{x^2} + \sqrt{y^2} - 2\sqrt{xy}$$

$$= x + y - 2\sqrt{xy} \quad (0,25)$$

$$f(x) = x^2 - 4x - 5 \quad (1) \text{ تمرينة 1}$$

$$f(x) = (x-2)^2 - 9 = x^2 - 4x + 4 - 9 = x^2 - 4x - 5 \quad (1)$$

$$f(-1) = 0 \quad f(3) = -8 \quad (0,5)$$

$$x=4 \text{ و } x=0 : -5 \text{ هبة}$$

$$x=3 \text{ و } x=1 : -8 \text{ هبة}$$

$$f(x) = 0 : \text{ جذور } A(x, 0) \in (C_f)$$

$$(x-2)^2 - 9 = 0 \rightarrow (x-2)^2 = 9 \rightarrow x-2 = \pm 3$$

$$\begin{cases} x-2 = -3 \\ x-2 = 3 \end{cases} \rightarrow \begin{cases} x = -1 \\ x = 5 \end{cases} \quad (0,5)$$

$$x = -1 \quad (0,25) \quad x = 5 \quad (0,25)$$

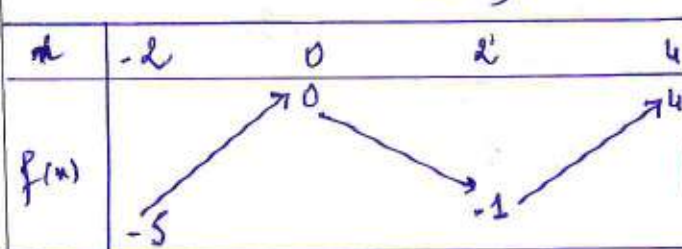
$$f(-2) = -5 \quad f(-1) = -1 \quad f(0) = 0 \quad f(1) = -\frac{1}{2}$$

$$f(x) = 0 \rightarrow \begin{cases} x = 0 \\ x = 3 \end{cases} \quad f(x) = -1 \rightarrow \begin{cases} x = -1 \\ x = 2 \end{cases}$$

$$f(x) = 0 \rightarrow \begin{cases} x = 0 \\ x = 3 \end{cases} \quad (0,25) \quad (0,25) : \text{ جدول الـ } x, y, z$$

x	-2	0	3	4
f(x)	-	0	-	+

جدول التغيرات



$$f(x) - g(x) = 0 \rightarrow f(x) = g(x) \rightarrow x = 6 \quad (0,25)$$

$$f(x) - g(x) \leq 0 \rightarrow f(x) \leq g(x)$$

$$x \in [-2, 2] \quad (0,25)$$

$$D_f = \{x/x \in \mathbb{R} : x-3 \neq 0\} \quad f(x) = \frac{x}{x+3}$$

$$x-3=0 \rightarrow x=3 \quad D_f = \mathbb{R} - \{3\} \quad (0,5)$$

$$D_f = \{x/x \in \mathbb{R} : x-4 \geq 0\} \quad f(x) = \sqrt{x-4}$$

$$x-4 \geq 0 \rightarrow x \geq 4 \quad x \in [4, +\infty[\quad (0,5)$$

$b \leq 2m \leq 8$: (3) شرط

$-3 \geq -3y \geq -15 \rightarrow -15 \leq -3y \leq -3$

$-9 \leq 2m - 3y \leq 5$ (1)

$B = \frac{x^2 y - 2}{\sqrt{m+y}}$ $4 \leq m+y \leq 9$
 $2 \leq \sqrt{m+y} \leq 3$

$\frac{1}{2} \geq \frac{1}{\sqrt{m+y}} \geq \frac{1}{3} \rightarrow \frac{1}{3} \leq \frac{1}{\sqrt{m+y}} \leq \frac{1}{2}$

$9 \leq m^2 \leq 16$ $\rightarrow 9 \leq x^2 y \leq 80$
 $1 \leq y \leq 5$

$7 \leq x^2 y - 2 \leq 78$

$\frac{7}{3} \leq \frac{x^2 y - 2}{\sqrt{m+y}} \leq \frac{78}{2}$ (1)

$C = \frac{5-m}{2y+3}$ $5 \leq 2y+3 \leq 13$
 $\frac{1}{13} \leq \frac{1}{2y+3} \leq \frac{1}{5}$

$-3 \geq -m \geq -4 \rightarrow -4 \leq -m \leq -3$

$1 \leq 5-m \leq 2$

$\frac{1}{13} \leq \frac{5-m}{2y+3} \leq \frac{2}{5}$ (1)

$|a-2| < 1 \rightarrow 2-1 < a < 2+1$
 $1 < a < 3$ (0,25)

$|b-3| < 1 \rightarrow 2 < b < 4$ (0,25)

$|\frac{a+b-5}{2}| < 1 \rightarrow |\frac{a+b-5}{2} - 0| < 1$

$-1 < \frac{a+b-5}{2} < 1$

$3 < a+b < 7$

$-2 < a+b-5 < 2$ (0,5)

$-1 < \frac{a+b-5}{2} < 1 \rightarrow$ حقیقت

$A-G = \frac{m+y}{2} - \sqrt{xy} = \frac{m+y - 2\sqrt{xy}}{2}$
 $= \frac{(\sqrt{m}-\sqrt{y})^2}{2}$ (0,5)

(0,25) $A > G$ زیرا $A-G > 0$

$H = \frac{2}{\frac{1}{x} + \frac{1}{y}} = \frac{2}{\frac{m+y}{xy}} = \frac{2xy}{m+y}$ (0,25)

$G-H = \sqrt{xy} - \frac{2xy}{m+y} = \frac{\sqrt{xy}(m+y) - 2xy}{m+y}$
 $= \frac{\sqrt{xy}(m+y) - 2xy}{m+y} = \frac{\sqrt{xy}(m+y - 2\sqrt{xy})}{m+y}$

$= \frac{\sqrt{xy}}{m+y} (\sqrt{m}-\sqrt{y})^2$ (1)

$G > H$ زیرا $G-H > 0$

$A \leq Q \rightarrow \frac{m+y}{2} \leq \sqrt{\frac{m^2+y^2}{2}}$

$(\frac{m+y}{2})^2 \leq \frac{m^2+y^2}{2} \rightarrow \frac{(m+y)^2}{4} \leq \frac{m^2+y^2}{2}$

$\frac{m^2+y^2+2my}{4} \leq \frac{m^2+y^2}{2}$

$0 \leq \frac{m^2+y^2}{2} - \frac{m^2+y^2+2my}{4}$

$0 \leq \frac{2(m^2+y^2) - m^2 - y^2 - 2my}{4}$

$0 \leq \frac{m^2+y^2 - 2my}{4}$ (1)

$0 \leq \frac{(m-y)^2}{4} \rightarrow$ حقیقت

$H < G < A < Q$: زیرا
 $\left. \begin{array}{l} H < G \\ G < A \\ A < Q \end{array} \right\}$ (0,5)