

احدًا صالحًا

$$① \quad x^3 - 20x^2 + 31x - 15 = 0 \quad x=1 \rightarrow 1 - 20 + 31 - 15 = 0 \checkmark$$

$$\begin{array}{r|l} x^3 - 20x^2 + 31x - 15 & x-1 \\ \hline x^2 - 14x + 15 & \end{array}$$

$$-(x^3 - x^2)$$

$$-14x^2 + 31x - 15$$

$$-(-14x^2 + 14x)$$

$$x^3 - 20x^2 + 31x - 15 = (x-1)(x^2 - 14x + 15)$$

$$x-1=0 \rightarrow x=1$$

$$15x - 15$$

$$-(15x - 15)$$

$$x^2 - 14x + 15 = 0 \Rightarrow 14 \pm \sqrt{14^2 - 4 \cdot 1 \cdot 15} = 25$$

$$\frac{14 \pm \sqrt{25}}{1} \quad \frac{21}{1}, \frac{11}{1}$$

$$R = \{1, -\frac{1}{2}, 2\}$$

$$ب) \quad x^3 - x^2 - 14x - 8 = 0 \quad x=-1 \rightarrow -1 - 1 + 14 - 8 = 0 \checkmark$$

$$\begin{array}{r|l} x^3 - x^2 - 14x - 8 & x+1 \\ \hline x^2 - 5x - 8 & \end{array}$$

$$-x^3 + x^2$$

$$-(x^2 - 5x - 8)$$

$$-5x - 8$$

$$-(-5x - 8)$$

0

$$x^3 - x^2 - 14x - 8 = (x+1)(x^2 - 5x - 8)$$

$$x+1=0$$

$$x^2 - 5x - 8 = 0 \Rightarrow \frac{5 \pm \sqrt{25 + 32}}{2} = \frac{5 \pm \sqrt{57}}{2}$$

$$x = \frac{5}{2} = 2.5 \quad (x-2)(x+4)=0$$

$$x = -\frac{4}{1}$$

$$R = \{-1, -\frac{1}{2}, 2\}$$

احدًا صالحي

① الف $x^3 - 20x^2 + 31x - 15 = 0 \xrightarrow{x=1} 1 - 20 + 31 - 15 = 0 \checkmark$

$$\begin{array}{r|l} x^3 - 20x^2 + 31x - 15 & x-1 \\ \hline x^2 - 14x + 15 & \end{array}$$

$-(x^3 - x^2)$

$-14x^2 + 31x - 15$

$-(-14x^2 + 14x)$

$x^3 - 20x^2 + 31x - 15 = (x-1)(x^2 - 14x + 15)$

$x-1=0 \rightarrow x=1$

$15x - 15$

$-(15x - 15)$

0

$\mathcal{R} = \mathcal{R} - \{-1, -\frac{1}{x}, x\}$

$x^2 - 14x + 15 = 0 \Rightarrow 14 \pm \sqrt{14^2 - 4 \cdot 1 \cdot 15} = 20$

$\frac{14 \pm \sqrt{14^2 - 4 \cdot 1 \cdot 15}}{2} = \frac{14 \pm 10}{2} = 12, 2$

ب) $x^3 - x^2 - 14x - 15 = 0 \xrightarrow{x=-1} -1 - 1 + 14 - 15 = 0 \checkmark$

$$\begin{array}{r|l} x^3 - x^2 - 14x - 15 & x+1 \\ \hline x^2 - 15x - 15 & \end{array}$$

$-(x^3 + x^2)$

$-15x - 15$

$-(-15x - 15)$

$-15x - 15$

$-(-15x - 15)$

0

$x^3 - x^2 - 14x - 15 = (x+1)(x^2 - 15x - 15)$

$x+1=0$

$x^2 - 15x - 15 = 0 \Rightarrow \frac{15 \pm \sqrt{15^2 + 4 \cdot 1 \cdot 15}}{2} = 17, -2$

$x = \frac{15 \pm \sqrt{15^2 + 4 \cdot 1 \cdot 15}}{2} = 17, -2$

$x = -\frac{15}{2}$

$\mathcal{R} = \mathcal{R} - \{-1, -\frac{1}{x}, x\}$

أهلاً صابري

① أ) $x\sqrt{3-2x} \neq 0 \rightarrow x \neq \sqrt{3-2x} \Rightarrow x^2 \neq 3-2x \Rightarrow x^2+2x-3 \neq 0$

$x \neq 1 \quad x \neq -3$

$3-2x \geq 0 \Rightarrow 2x \leq 3 \Rightarrow x \leq \frac{3}{2} \quad D = (-\infty, \frac{3}{2}] - \{-3, 1\}$

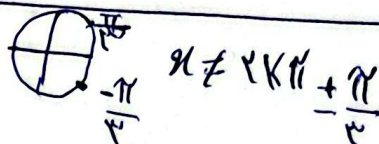
② ب) $x - \sqrt{3x-2} \neq 0 \rightarrow x \neq \sqrt{3x-2} \rightarrow x^2 \neq 3x-2 \Rightarrow x^2-3x+2=0$

$x \neq 1 \quad x \neq 2$

$3x-2 \geq 0 \rightarrow 3x \geq 2 \Rightarrow x \geq \frac{2}{3} \quad D = [\frac{2}{3}, +\infty) - \{1, 2\}$

③ أ) $2\cos x - 1 \neq 0 \rightarrow \cos x \neq \frac{1}{2}$

$D = \mathbb{R} - \{2k\pi \pm \frac{\pi}{3}\}$



④ ب) $2\sin x + 1 \neq 0 \rightarrow \sin x \neq -\frac{1}{2}$

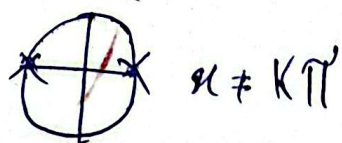
$D = \mathbb{R} - \{2k\pi + \frac{7\pi}{6}, 2k\pi + \frac{11\pi}{6}\}$



⑤ ج) $\cos x - 1 \neq 0 \rightarrow \cos x \neq 1$

$\cos x \neq 0$

$\sin x \neq 0$

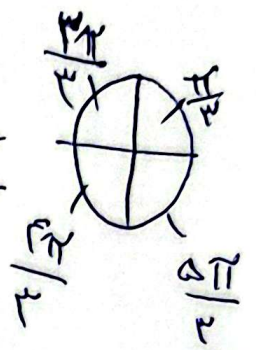


$D = \mathbb{R} - \{2k\pi, k\pi\}$

احرار صالحي

③ $\Rightarrow \sin^2 \theta - 3 \neq 0 \Rightarrow \sin^2 \theta \neq \frac{3}{4} \Rightarrow \sin \theta \neq \pm \frac{\sqrt{3}}{2}$

$$D = R - \left\{ K\pi \pm \frac{\pi}{3} \right\}$$



④ الف) $x^2 - 5x + 4 > 0$
 $(x-1)(x-4)$

$$\begin{array}{c} 1 \quad 4 \\ + \quad - \quad + \end{array} \quad (-\infty, 1) \cup (4, +\infty)$$

ب) $x^2 - 9x + 5 < 0$
 $(x-1)(x-5)$

$$\begin{array}{c} 1 \quad 5 \\ + \quad - \quad + \end{array} \quad 1, 5$$

ج) $x^2 + 9x + 5 > 0$

$$\begin{array}{c} -5 \quad -1 \\ + \quad - \quad + \end{array} \quad (-\infty, -5] \cup [-1, +\infty)$$

د) $x^2 - 10x + 9 \leq 0$

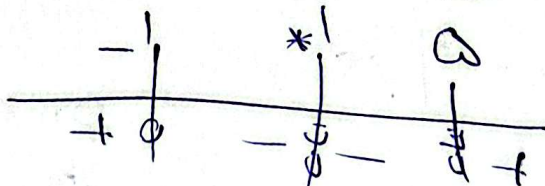
$$\begin{array}{c} 1 \quad 9 \\ + \quad - \quad + \end{array} \quad [1, 9]$$

هـ) الف) $\frac{x^2 - 3x + 2}{x - 5} < 0$ $x^2 - 3x + 2 = 0 \rightarrow x = 1, 2$
 $x - 5 = 0 \rightarrow x = 5$

$$\begin{array}{c} 1 \quad 2 \quad 5 \\ - \quad + \quad - \quad + \end{array}$$

$D = (-\infty, 1) \cup (2, 5)$

ب) $\frac{x^2 - 1}{x^2 - 9x + 5} \geq 0$ $x^2 - 1 = 0 \rightarrow x = \pm 1$
 $x^2 - 9x + 5 = 0 \rightarrow x = 1, 5$



$D = \{ -\infty, -1 \} \cup (5, +\infty)$

$$\textcircled{6} \rightarrow \frac{x^2 - 5x + 3}{x^3 - 1} \quad x^3 - 5x + 3 = 0 \rightarrow x = 1, 3 \quad \frac{1}{-} \frac{3}{+}$$

$$x^3 - 1 = 0 \Rightarrow x = 1 \quad D = [3, +\infty)$$

$$\hookrightarrow x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1 \quad D = \mathbb{R} - \{\pm 1\}$$

$$\textcircled{7} \text{ اى } x^2 - 3x > 0 \quad x(x-3) > 0 \quad \frac{0}{+} \frac{3}{+} \quad D = (-\infty, 0) \cup (3, +\infty)$$

$$\hookrightarrow 4 - x^2 > 0 \quad \frac{-4}{-} \frac{4}{+} \quad (-4, 4) \textcircled{1}$$

$$|x| - 2 > 0 \quad |x| > 2 \rightarrow (-\infty, -2) \cup (2, +\infty) \textcircled{2}$$

$$|x| - 2 \neq 1 \quad |x| \neq 3 \rightarrow x \neq \pm 3 \textcircled{3}$$

$$D = \textcircled{1} \cap \textcircled{2} \cap \textcircled{3} = ((-\infty, 3) \cup (4, 6)) - \{3\}$$

$$\hookrightarrow \frac{x^2 - 6x + 12}{x - 3} > 0 \quad \begin{array}{l} x^2 - 6x + 12 = 0 \quad x = 3, 9 \\ x - 3 = 0 \quad x = 3 \end{array} \quad \frac{9}{+} \frac{12}{-} \frac{3}{+}$$

$$10 - x > 0 \rightarrow x < 10 \textcircled{4}$$

$$10 - x \neq 0, x \neq 10 \textcircled{5}$$

$$(-\infty, 3) \cup (4, +\infty) \textcircled{1}$$

$$D = \textcircled{1} \cap \textcircled{4} \cap \textcircled{5} = ((-\infty, 3) \cup (4, 10)) - \{3\}$$

$$> \quad x^2 - 11x + 28 \geq 0 \rightarrow (x-4)(x-7) \geq 0 \quad \frac{4}{+} \frac{7}{-} \quad (-\infty, 4] \cup [7, +\infty)$$

$$x^2 - 9 > 0 \rightarrow x^2 < 9 \rightarrow |x| < 3 \rightarrow -3 < x < 3 \textcircled{6}$$

$$x \neq 1 \textcircled{7} \quad x > 0 \textcircled{8}$$

$$D = \textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \cap \textcircled{4} = (0, 4]$$

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هذو صا لى
 $y = \frac{x^2 - x}{x^2 + x}$

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

وس اول

	-1	0	1	
$x^2 - x$	+	+	-	+
$x^2 + x$	+	-	+	+
y	+	-	-	+

وس دوم

	-1	0	1	
$x^2 - x$	+	-	-	+
$x^2 + x$	+	-	+	+
y	+	-	-	+

9

$D = \frac{x - f(x)}{f(x)} \geq 0$

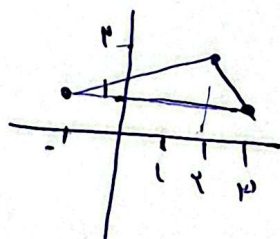
$x - f(x) = 0 \rightarrow x = f(x)$

$f(x) = 0 \Rightarrow x = -2, 2$

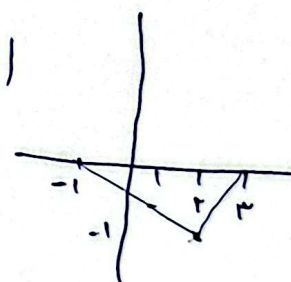
	-2	-1	1	2	
$x - f(x)$	-	+	+	-	
$f(x)$	+	-	+	-	
D	-	+	-	+	

$D = [-2, -1] \cup (1, 2]$

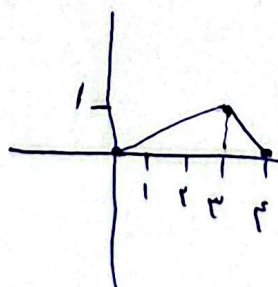
$f(x) + 1$



$-f(x)$



$f(x-1)$



$f(x+1) + 2$

