

18 احسب صالحي

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

$$x^3 - 20x^2 + 31x - 15 \mid x - 1$$

$D_f = 1R - \{1, \frac{1}{2}, \frac{5}{2}\}$

1,5

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

$x^2 - 14x + 15$

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

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

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

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

$15x - 15$

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

$-(15x - 15)$

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

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

ب) $x^3 - x^2 - 14x - 8 = 0 \xrightarrow{x=-1} -1 - 1 + 14 - 8 = 0 \checkmark$

$$x^3 - x^2 - 14x - 8 \mid x + 1$$

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

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

$x+1=0$

$-2x^2 - 14x - 8$

$x^2 - 2x - 8 = 0 \Rightarrow \frac{2 \pm \sqrt{2^2 - 4(1)(-8)}}{2} = \frac{2 \pm \sqrt{36}}{2} = \frac{2 \pm 6}{2}$

$-(-2x^2 - 14x - 8)$

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

$-2x - 8$

$x = -\frac{-2}{2} = -1$

$-(-2x - 8)$

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

احدًا صالحي

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

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

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

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

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

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

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

$$15x - 15$$

$$-(15x - 15)$$

$$x^2 - 14x + 15 = 0 \Rightarrow 14 = x + (x) = 2x$$

$$\frac{14 \pm \sqrt{196}}{2} \quad \frac{21}{2}, \frac{11}{2}$$

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

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

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

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

$$-15x - 15$$

$$-(-15x - 15)$$

$$-15x - 15$$

$$-(-15x - 15)$$

$$0$$

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

$$x+1=0$$

$$x^2 - 15x - 15 = 0 \Rightarrow x = \frac{15 \pm \sqrt{225 + 60}}{2}$$

$$x = \frac{4}{2} = 2 \quad (x-2)(x+3)=0$$

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

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

أهلاً صابري

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

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

$3-2x \geq 0 \Rightarrow 2x \leq 3 \Rightarrow x \leq \frac{3}{2}$

$D = (-\infty, \frac{3}{2}] - \{-3, 1\}$

جواب زائد

115

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

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

$3x-2 \geq 0 \rightarrow 3x \geq 2 \Rightarrow x \geq \frac{2}{3}$

$D = [\frac{2}{3}, +\infty) - \{1, 2\}$

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

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



$x \neq 2k\pi + \frac{\pi}{3}$
 $x \neq 2k\pi - \frac{\pi}{3}$

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) $\cot x - 1 \neq 0 \rightarrow \cot x \neq 1$

$\cos x \neq 0$

$\sin x \neq 0$



$x \neq k\pi + \frac{\pi}{4}$

$x \neq k\pi$

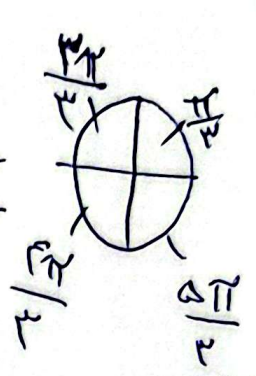
$D = \mathbb{R} - \{k\pi + \frac{\pi}{4}, k\pi\}$

9

احرار صالحي

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

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



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

Number line: $\frac{+}{-} \frac{+}{-} \frac{+}{+}$ at points 1 and 4.

Solution: $(-\infty, 1) \cup (4, +\infty)$ ✓

ب) $x^2 - 9x + 5 < 0$
 $(x-1)(x-5)$

Number line: $\frac{+}{-} \frac{+}{-} \frac{+}{+}$ at points 1 and 5.

Solution: $(1, 5)$ ✓

ج) $x^2 + 9x + 5 > 0$

Number line: $\frac{+}{-} \frac{+}{-} \frac{+}{+}$ at points -5 and -1.

Solution: $(-\infty, -5] \cup [-1, +\infty)$ ✓

د) $x^2 - 10x + 9 \leq 0$

Number line: $\frac{+}{-} \frac{+}{-} \frac{+}{+}$ at points 1 and 9.

Solution: $[1, 9]$ ✓

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

Number line: $\frac{-}{+} \frac{+}{-} \frac{-}{+}$ at points 1, 2, and 5.

$D = (-\infty, 1) \cup (2, 5)$ ✓

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

Number line: $\frac{+}{-} \frac{+}{-} \frac{+}{+}$ at points -1, 1, and 5. There is an asterisk at 1.

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

$x^2 - 5x + 3$
 $x^3 - 1$
 $D = [3, +\infty)$ ✓

$x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1$
 $D = \mathbb{R} - \{\pm 1\}$ (5) ✓

$x^2 - 3x > 0 \Rightarrow x(x-3) > 0$
 $D = (-\infty, 0) \cup (3, +\infty)$ ✓

$14 - x^2 > 0 \Rightarrow -x^2 > -14 \Rightarrow x^2 < 14$
 $D = (-\sqrt{14}, \sqrt{14})$ (1)

$|x| - 2 > 0 \Rightarrow |x| > 2 \Rightarrow (-\infty, -2) \cup (2, +\infty)$ (2)

$|x| - 2 \neq 1 \Rightarrow |x| \neq 3 \Rightarrow x \neq \pm 3$
 $D = (-3, -2) \cup (2, 3) - \{\pm 3\}$

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

$\frac{x^2 - 6x + 12}{x - 3} > 0$
 $x^2 - 6x + 12 = 0 \Rightarrow x = 3 \pm \sqrt{3}$
 $x - 3 = 0 \Rightarrow x = 3$
 $D = (-\infty, 3) \cup (3, +\infty)$ (1)

$10 - x > 0 \Rightarrow x < 10$ (2)

$10 - x \neq 0 \Rightarrow x \neq 10$ (3)

$D = (3, 10) - \{9\}$

$D = (1) \cap (2) \cap (3) = (1 - \infty, 3) \cup (3, 10) - \{9\}$

$x^2 - 11x + 28 \geq 0 \Rightarrow (x-4)(x-7) \geq 0$
 $D = (-\infty, 4] \cup [7, +\infty)$ (1)

$x^2 > 0 \Rightarrow x^2 < 9 \Rightarrow |x| < 3 \Rightarrow -3 < x < 3$ (2)

$x \neq 1$ (3)
 $x > 0$ (4)

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

11

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

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

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

1,0

وس اول

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

وس دوم

	-1	0	1	
	+	-	+	+

9

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

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

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

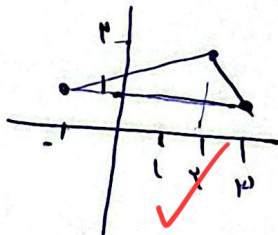
$x - f(x)$
 $f(x)$

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

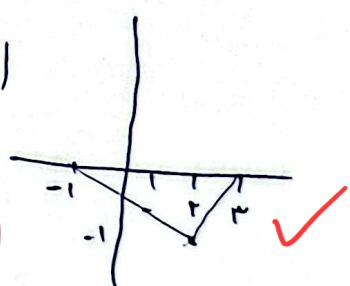
$D = [-2, -1] \cup (2, 3]$

2

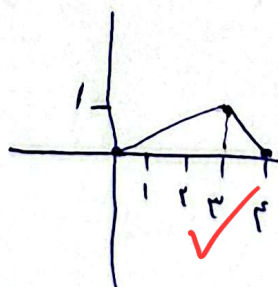
$f(x) + 1$



$-f(x)$



$f(x-1)$



$f(x+1) + 2$

