

تلفیف : 6

A: کتب اثباتی / کلاس

19, 25

سوال 1:

الف) $4x^3 - 20x^2 + 31x - 15 \neq 0$
 $(2x-3)(2x-5)(x-1) \neq 0$
 $D_f = R - \left\{ \frac{3}{2}, \frac{5}{2}, 1 \right\}$

$$\begin{array}{r} 4x^3 - 20x^2 + 31x - 15 \quad | \quad x+1 \\ \underline{4x^3 - 4x^2} \\ -16x^2 + 31x - 15 \\ \underline{-16x^2 + 16x} \\ 15x - 15 \\ \underline{15x - 15} \\ 0 \end{array}$$

$4x^2 - 16x + 15$
 $\downarrow$
 $(2x+3)(2x-5)$

2

ب) $3x^3 - x^2 - 11x - 4 \neq 0$
 $D_f = R - \left\{ -\frac{2}{3}, -1, 2 \right\}$

$$\begin{array}{r} 3x^3 - x^2 - 11x - 4 \quad | \quad x+1 \\ \underline{3x^3 - 2x^2 - 11x - 4} \\ 3x^2 - 4x - 4 \\ \underline{3x^2 - 4x - 4} \\ 0 \end{array}$$

$3x^2 - 4x - 4$
 $\downarrow$
 $3x^2 - 4x - 4 = 0$
 $x = \frac{4 \pm \sqrt{16 - 4 \cdot 3 \cdot (-4)}}{2 \cdot 3} = \frac{4 \pm 8}{6}$
 $= 2 \text{ و } -\frac{2}{3}$

الف) $x - \sqrt{3-2x} \neq 0 \Rightarrow x \neq \sqrt{3-2x} \Rightarrow x^2 \neq 3-2x \Rightarrow x^2 + 2x - 3 \neq 0$
 $3-2x \geq 0 \Rightarrow 3 \geq 2x \Rightarrow \frac{3}{2} \geq x$
 $D_f = (-\infty, \frac{3}{2}] - \{1\}$

سوال 2

1, 15a

ب) $x - \sqrt{3x-2} \neq 0 \Rightarrow x \neq \sqrt{3x-2} \Rightarrow x^2 \neq 3x-2 \Rightarrow x^2 - 3x + 2 = (x-1)(x-2) \neq 0$
 $3x-2 \geq 0 \Rightarrow 3x \geq 2 \Rightarrow x \geq \frac{2}{3}$
 $D_f = [\frac{2}{3}, +\infty) - \{1, 2\}$

$x = -3 \quad y = \frac{-2}{-4}$

الف) $4 \cos x - 1 \neq 0 \Rightarrow 4 \cos x \neq 1 \Rightarrow \cos x \neq \frac{1}{4}$
 $D_f = R - \left\{ 2k\pi + \frac{\pi}{4}, 2k\pi + \frac{7\pi}{4} \right\}$

سوال 3

2

ب) $4 \sin x + 1 \neq 0 \Rightarrow 4 \sin x \neq -1 \Rightarrow \sin x \neq -\frac{1}{4}$
 $D_f = R - \left\{ 2k\pi - \frac{\pi}{4}, 2k\pi + \frac{7\pi}{4} \right\}$

ج) $\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1$
 $D_f = R - \left\{ \frac{k\pi}{2}, k\pi + \frac{\pi}{2} \right\}$

د) $4 \sin^2 x - 3 \neq 0 \Rightarrow 4 \sin^2 x \neq 3 \Rightarrow \sin^2 x \neq \frac{3}{4} \Rightarrow \sin x \neq \pm \frac{\sqrt{3}}{2}$
 $D_f = R - \left\{ k\pi \pm \frac{\pi}{3} \right\}$

الف) $x^2 - 5x + 4 > 0 \Rightarrow (x-1)(x-4) > 0$
 $D_f = (-\infty, 1) \cup (4, +\infty)$

سوال 4

2

ب) $x^2 - 6x + 5 < 0 \Rightarrow (x-1)(x-5) < 0$
 $D_f = (1, 5)$

$$\begin{array}{cc} 2 & 3 \\ + & - \\ 1 & 5 \\ + & - \end{array}$$

انبار

$$ج) x^2 + 4x + 5 \geq 0 \Rightarrow (x+1)(x+5) \geq 0$$

$$\frac{-5}{+} \frac{-1}{-}$$

ادام سوال ۴

$$D_f = (-\infty, -5] \cup [-1, +\infty)$$

$$د) x^2 - 5x + 4 \leq 0 \Rightarrow (x-1)(x-4) \leq 0$$

$$\frac{1}{+} \frac{4}{-} \frac{-1}{+} \quad D_f = [1, 4]$$

$$اف) \frac{x^2 - 4x + 5}{x-5} = \frac{(x-1)(x-4)}{x-5} < 0$$

$$D_f = (-\infty, -1] \cup [4, +\infty)$$

$$\frac{1}{-} \frac{4}{+} \frac{-5}{-}$$

سوال ۵

۳

$$ب) \frac{x^2 - 1}{x^2 - 4x + 5} = \frac{(x-1)(x+1)}{(x-1)(x-4)} \geq 0$$

$$\frac{-1}{+} \frac{1}{-} \frac{5}{-}$$

$$D_f = (-\infty, -1] \cup (4, +\infty)$$

$$اف) \frac{x^2 - 4x + 3}{x^2 - 1} = \frac{(x-1)(x-3)}{(x-1)(x+1)} \geq 0$$

$$\frac{1}{-} \frac{3}{-} \frac{1}{+}$$

$$D_f = [3, +\infty)$$

سوال ۶

۲

$$ب) x^2 - 1 = (x+1)(x-1) \neq 0 \Rightarrow x \neq 1 \text{ و } -1$$

$$D_f = \mathbb{R} - \{\pm 1\}$$

$$اف) x^2 - 3x > 0 \Rightarrow x(x-3) > 0$$

$$\frac{0}{+} \frac{3}{-}$$

$$D_f = (-\infty, 0) \cup (3, +\infty)$$

سوال ۷

$$ب) 14 - x^2 > 0 \Rightarrow 14 > x^2 \Rightarrow 4 > x \text{ و } -4 < x$$

$$\begin{cases} |x| - 2 > 0 \Rightarrow |x| > 2 \Rightarrow x > 2 \text{ و } x < -2 \\ |x| - 2 \neq 1 \Rightarrow x \neq 3 \text{ و } -3 \end{cases}$$

$$D_f = (-4, -2) \cup (2, 4) - \{\pm 3\}$$

۲

$$ج) \frac{x^2 - 7x + 12}{x-3} = \frac{(x-3)(x-4)}{x-3} > 0$$

$$\frac{3}{-} \frac{4}{-}$$

$$\left. \begin{aligned} 10 - x > 0 &\Rightarrow 10 > x \\ 10 - x \neq 1 &\Rightarrow x \neq 9 \end{aligned} \right\} \Rightarrow D_f = (4, 10) - \{9\}$$

$$د) x^2 - 11x + 28 \geq 0 \Rightarrow (x-4)(x-7) \geq 0$$

$$34 - x^2 > 0 \Rightarrow (4-x)(4+x) > 0$$

$$\frac{4}{+} \frac{4}{-}$$

$$x > 0 \text{ و } x \neq 1$$

$$\frac{-4}{-} \frac{4}{+}$$

$$D_f = (0, 4] - \{1\}$$

$$y = \frac{x^2 - x}{x^2 + x} = \frac{x(x-1)}{x(x+1)}$$

$$\begin{aligned} x(x+1) &\neq 0 \\ x &\neq 0 \\ x &\neq -1 \end{aligned}$$

سوال ۸

۲

روش
آب پاشی

$$\frac{-1}{+} \frac{0}{-} \frac{1}{+}$$

روش
آب پاشی

	-1	0	1	
$x^2 - x$	+	+	-	+
$x^2 + x$	+	+	-	+
$P(x)$	+	-	-	+

$$y = \sqrt{\frac{x - f(x)}{f(x)}} \Rightarrow \frac{x - f(x)}{f(x)} \geq 0$$

$$f(x) \neq 0 \Rightarrow x \neq -2 \text{ و } 2$$

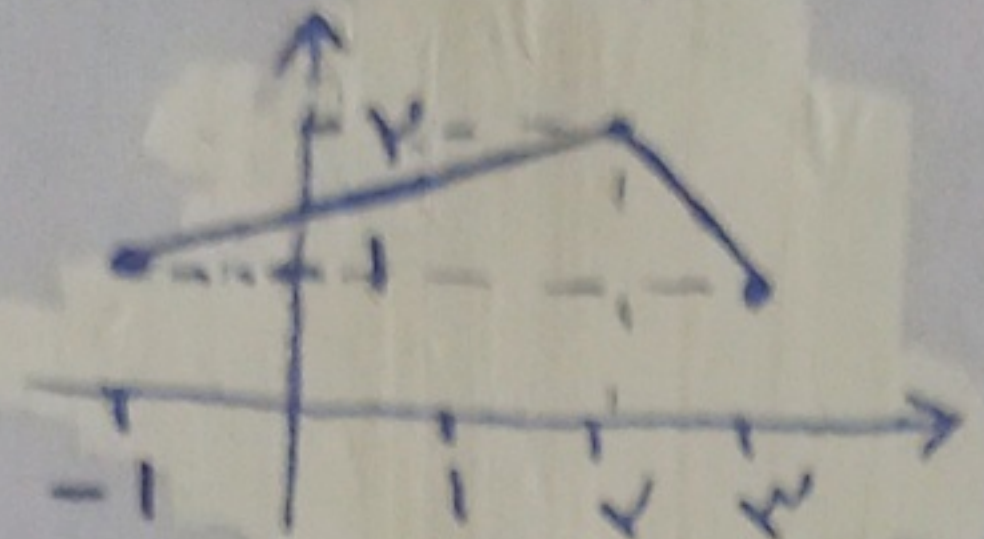
سوال ۹

$$D_f = (-2, -1] \cup (2, 3]$$

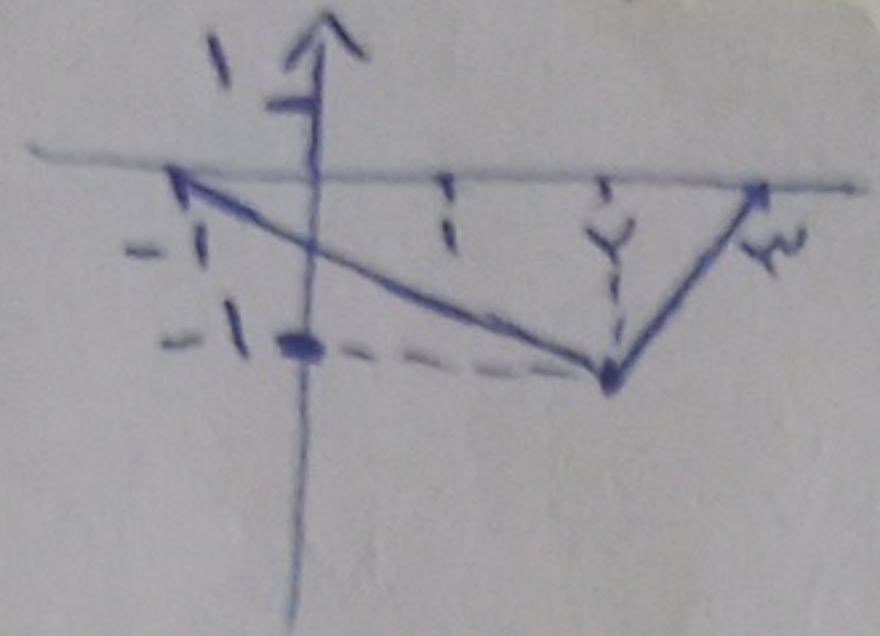
جدول تکسین علامت؟

سوال ۱۰

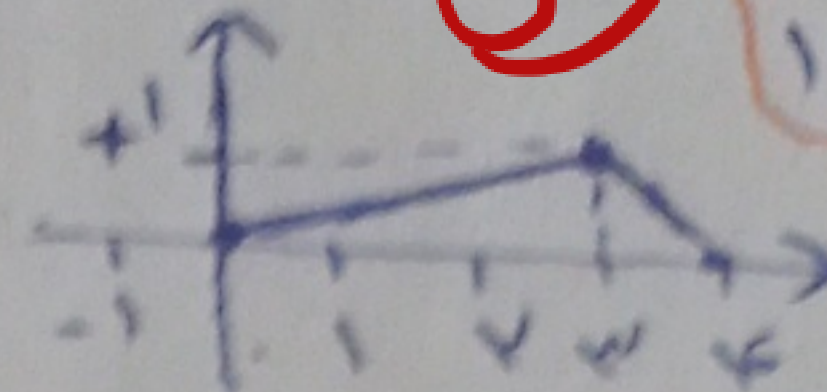
الف) $f(x) + 1$



ب) $f(x)$



ج) $f(x - 1)$



د) $f(x + 1) + 2$

