

تلفیق : 6 A: آیدین اثباتی کلاس

سوال 1

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

$$\begin{array}{r} 4x^3 - 20x^2 + 31x - 15 \\ - 4x^3 + 4x^2 \\ \hline -16x^2 + 31x - 15 \\ - -16x^2 + 16x \\ \hline 15x - 15 \end{array}$$

$$\begin{array}{r} 4x^2 - 16x + 15 \\ \downarrow \\ (2x+3)(2x-5) \end{array}$$

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

$$\begin{array}{r} 3x^3 - x^2 - 11x - 4 \\ \downarrow \\ 3x^3 - 4x - 4 \\ \downarrow \\ 3x^2 - 4x - 4 \\ \downarrow \\ 3x^2 - 12x + 12x - 4x - 4 \\ \downarrow \\ 12x - 4 \\ \downarrow \\ 12x - 12 + 12 - 4 \\ \downarrow \\ 12 - 4 = 8 \end{array}$$

$$\frac{4 \pm \sqrt{16 - 4 \times 3 \times (-4)}}{2 \times 3} = \frac{4 \pm 8}{6}$$

= 2 و  $-\frac{2}{3}$

$x+1 \neq 0$   
 $x \neq -1$

سوال 2

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

$(x-1)(x+3) \neq 0$   
 $x \neq 1$  و  $-3$

$D_f = \left[ \frac{x}{2}, +\infty \right) - \{1, -3\}$

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

سوال 3

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

ب)  $\sqrt{2} \sin x + 1 \neq 0 \Rightarrow \sqrt{2} \sin x \neq -1 \Rightarrow \sin x \neq -\frac{1}{\sqrt{2}}$   
 $D_f = R - \left\{ 2k\pi - \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4} \right\}$

ج)  $\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1$  و  $\tan x \neq 1$  و  $\cot x \neq 0$  و  $\tan x \neq 0$   
 $D_f = R - \left\{ \frac{k\pi}{2}, k\pi + \frac{\pi}{4} \right\}$

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

سوال 4

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

$$\begin{array}{c} 4 \quad 1 \\ + \phi - \phi + \end{array}$$

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

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

ادامه سوال ۴ →

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

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

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

$$د) x^2 - 7x + 4 \leq 0 \Rightarrow (x-1)(x-4) \leq 0$$

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

سوال ۵

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

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

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

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

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

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

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

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

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

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

چون فی جبهه داریم  
معادله را نداریم بی این

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

سوال ۶

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

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

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

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

$$|x| - 2 > 0 \Rightarrow |x| > 2 \Rightarrow x > 2 \text{ و } x < -2$$

$$|x| - 2 \neq 1 \Rightarrow x \neq 3 \text{ و } -3$$

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

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

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

$$10 - x > 0 \Rightarrow 10 > x, \quad 10 - x \neq 1 \Rightarrow x \neq 9$$

$$\Rightarrow D_f = (4, 10) - \{9\}$$

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

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

$$x > 0, \quad x \neq 1$$

$$\frac{4}{+\phi} - \frac{7}{-\phi} +$$

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

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

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

$$x(x+1) \neq 0$$

$$x \neq 0$$

$$x \neq -1$$

سوال ۸

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

اوش  
شرح:

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

اوش  
آبایرمانی:

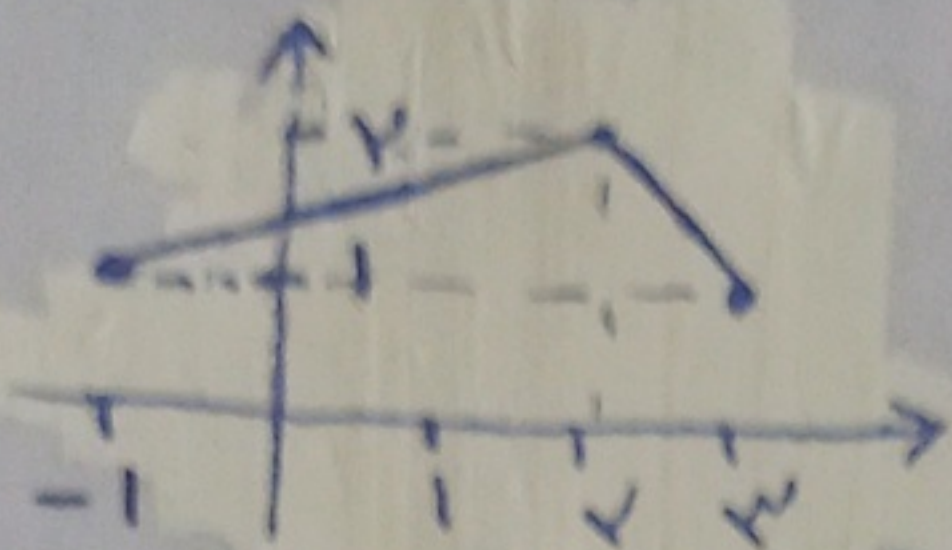
$$y = \sqrt{\frac{x - f(x)}{f(x)}} \Rightarrow \frac{x - f(x)}{f(x)} \geq 0$$

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

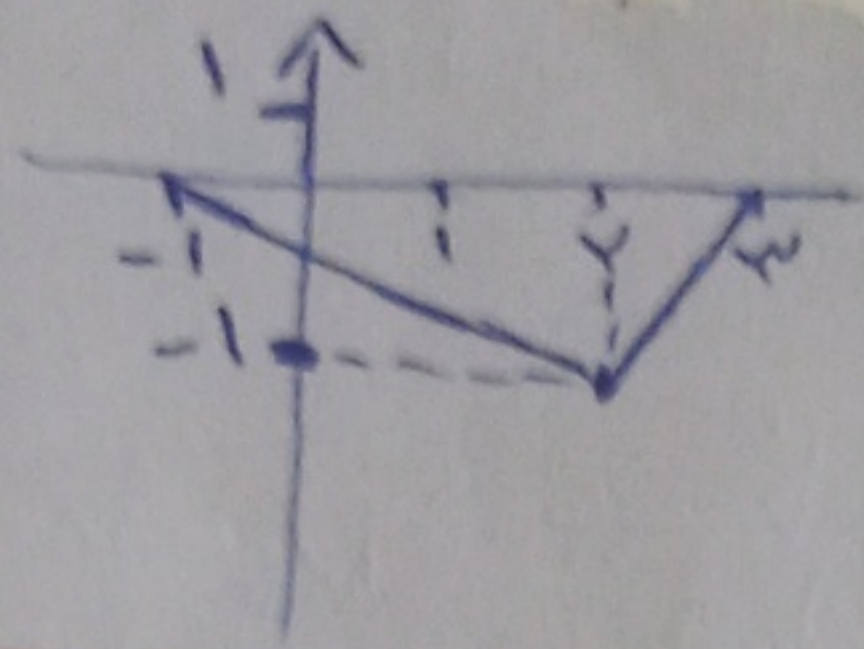
سوال ۹

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

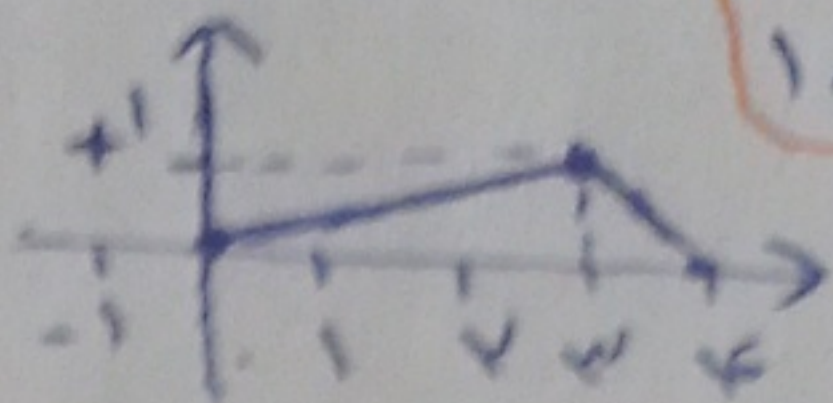
الف)  $f(x) + 1$



ج)  $-f(x)$



ب)  $f(x-1)$



سوال ۱۰

د)  $f(x+1) + 2$

