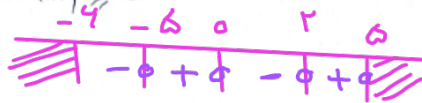


برای آنکه نیرادیکال مثبت تریا مساوی صفت باشد باید x و $f(x)$ هم علامت باشند، پس:

$$y = \sqrt{x f(x)} \rightarrow x f(x) \geq 0$$



$$\Rightarrow D_f = [-5, 0] \cup [2, 5]$$

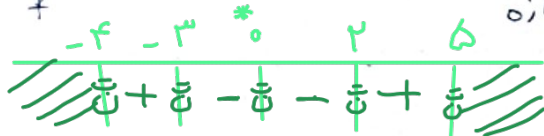
1, 5

$$y = \sqrt{\frac{-x}{f(x)}} \rightarrow \frac{-x}{f(x)} > 0$$

$$f(x) \neq 0 \rightarrow -3, 0, 2, 5$$

$$\Rightarrow D_f = (-3, 0) \cup (0, 2) \Rightarrow \text{مقادیر} = \underline{(-2, -1, 1)}$$

1, 5



حالت اول: $f(x) < 0, x > 0$

حالت دوم: $f(x) > 0, x < 0$

$$f(x) - 2f(1) = x^2 - 3x + 4$$

$$f(1-2) = ?$$

$$\rightarrow f(1) = f(1) - 2f(1) = 1^2 - 3(1) + 4 \rightarrow -f(1) = 2 \Rightarrow f(1) = -2$$

$$\rightarrow f(-2) - 2f(1) = \frac{(-2)^2}{-2} - \frac{3(-2)}{4} + 4 \Rightarrow f(-2) = 10$$

2 ✓

$$\begin{cases} x - \sqrt{x+4} & x > 3 \\ 2x + 3 & x \leq 3 \end{cases} \rightarrow f(x) \rightarrow \begin{cases} 5 - \sqrt{5+4} = 2 \rightarrow 2(2) + 3 = 7 \\ 2(1) + 3 = 5 \rightarrow 5 - \sqrt{5+4} = 2 \end{cases}$$

$$f(f(5)) + f(f(1)) = ? \rightsquigarrow 7 + 2 = 9$$

2 ✓

$$f(x) = ax^2 - bx + 2 \rightarrow f(x-1) = a(x-1)^2 - b(x-1) + 2 \rightarrow ax^2 - 2ax + a - bx + b + 2$$

$$f(x-1) - f(x) = 4x + 2 \rightarrow ax^2 - 2ax + a - bx + b + 2 - (ax^2 - bx + 2) = 4x + 2$$

$$a - b = 0$$

$$\rightsquigarrow -2ax + a + b = 4x + 2 \rightarrow -2a = 4 \rightarrow a = -2$$

$$\rightarrow a + b = 2 \rightarrow b = 2$$

2 ✓

$$a - b = -2 - 2 = -4$$

$$f(x) = x^2 - 3x + 1$$

$$\rightarrow f(x) = (x)^2 - 3(x) + 1 = 1$$

$$\frac{x f(x) + f(-1)}{f'(x)} = 0$$

$$\rightarrow f(-1) = (-1)^2 - 3(-1) + 1 = 5$$

$$\rightarrow f'(x) = (x)^2 - 3(x) + 1 = -1$$

$$\Rightarrow \frac{x(1) + 5}{(-1)^2} = 5$$

(P) ✓

$$f(x) = \begin{cases} x+1 & x \geq 2 \\ x^2 & x < 2 \end{cases}$$

$$\rightarrow f(x) = x(x) + 1 = 13$$

$$\rightarrow f(-2) = (-2)^2 = 4$$

$$\rightarrow f'(x) = x(x) + 1 = 5$$

$$\frac{x f(x) - x f(-2)}{f'(x)} = 0$$

$$\Rightarrow \frac{x(13) - x(4)}{5} = \frac{x}{5}$$

(P) ✓

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

$$\rightarrow f(x) = 1 \rightarrow f(1) = 4$$

$$\rightarrow f(2) = 2 \rightarrow f(2) = 4$$

$$\rightarrow f(1) = 4$$

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

$$\Rightarrow \frac{4 - 4}{4 - 2} = 0$$

(P) ✓

$$f(x) = \frac{x^2 + 2x + 9}{x^2 + 2x + 5}$$

$$\rightarrow \frac{(\sqrt{x}-1)^2 + 2(\sqrt{x}-1) + 9}{(\sqrt{x}-1)^2 + 2(\sqrt{x}-1) + 5} = \frac{x - \cancel{2\sqrt{x}} + 1 + 2\sqrt{x} - 2 + 9}{x - \cancel{2\sqrt{x}} + 1 + 2\sqrt{x} - 2 + 5} = \frac{1}{5} = 2$$

$$f(f(\sqrt{x}-1)) = 0$$

$$\rightarrow \frac{x^2 + 2(x) + 9}{(x)^2 + 2(x) + 5} = \frac{x+1+9}{x+1+5} = \frac{x}{10}$$

(P) ✓

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

$$\rightarrow f(\sqrt{x}) = (\sqrt{x})^2 + \frac{1}{(\sqrt{x})^2} = x + \frac{1}{x} \xrightarrow{\text{put } x} x^2 + \frac{1}{x^2} + 2$$

$$(f(\sqrt{x}))^2 - f(x) = 0$$

$$\rightarrow x^2 + \frac{1}{x^2} + 2 - x^2 - \frac{1}{x^2} = 2$$

(P) ✓