

الف) $f(x) = \sqrt{\frac{x-1}{x}} - \frac{x}{x-1}$
 ب) $f(x) = \frac{1}{x+1} - \frac{2}{x}$
 $\frac{3}{x-1} + \frac{1}{x+2}$
 $\frac{-x-2}{x^2+x} \neq 0$
 $\frac{4x+5}{x^2+x-2} \neq 0$
 $D_f = (-\infty, 0) \cup (0/5, 1)$
 $D_f = \mathbb{R} - \{-5/4, -1, 0, 2, 1\}$

الف) $f(x) = \sqrt{\left(\left(\frac{1}{3}\right)^x - 9\right)(32 - 4^x)}$ $x \geq 0$
 ب) $f(x) = 4\sqrt{x-1} + \sqrt{y+1} = 3$
 $\sqrt{y+1} = 3 - 4\sqrt{x-1}$
 $y+1 = 9 - 8\sqrt{x-1} + 16(x-1)$
 $y = 8 + \sqrt{x-1} - 6\sqrt{x-1}$
 $D_f = (-\infty, 2] \cup [10/2, +\infty)$
 $D_f = [1, 8/2]$

$f(x) = \frac{\log_2(x^2-x-2)}{\sqrt{x^2-1}+1}$
 $x^2-x-2 > 0 \rightarrow (x-2)(x+1) > 0$
 $D_f = (-\infty, -1) \cup (2, +\infty)$
 $x^2-1 \geq 0 \rightarrow x^2 \geq 1$
 $x \geq 1$ یا $x \leq -1$

-2 ، b ریشه های $\sqrt{3+ax-x^2}$ هستند پس
 $3-2a-4=0 \rightarrow a=0/5 \rightarrow \sqrt{3-0/5x-x^2} \rightarrow \Delta = 0/25 + 12 \cdot 12/25$
 $\frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow \frac{0/5 \pm 3/5}{-2} = \frac{-2}{2} \rightarrow \frac{3}{2}$
 $D_f = [1/5, b]$
 $[1, a+b]$

$f(x) \geq x$
 $f(x) = \begin{cases} 3x-2; x \geq 1 \\ 2x+3; x < 1 \end{cases}$
 $3x-2 \geq x \rightarrow 2x \geq 2 \rightarrow x \geq 1$
 $2x+3 \geq x \rightarrow x+3 \geq 0$
 $x \geq -3$
 $D_f = [-3, +\infty)$

$$f(x) = \begin{cases} (a+1)(x+2) & ; x > 1 \\ 3a+2x & ; x \leq 1 \end{cases} \quad 2f(5) - f(-2) + a$$

بابتی

$$2(7a+7) = 3a-4+a \rightarrow 14a+14 = 4a-4-10a-18$$

$$a = -1/8$$

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2 \quad f(2-\sqrt{3}) + f(2+\sqrt{3})$$

$$\sqrt{2-\sqrt{3}} + \sqrt{2+\sqrt{3}} + \frac{1}{\sqrt{2-\sqrt{3}}} + \frac{1}{\sqrt{2+\sqrt{3}}} + 4$$

$$\rightarrow \sqrt{2-\sqrt{3}} + \sqrt{2+\sqrt{3}} + \frac{\sqrt{2+\sqrt{3}} + \sqrt{2-\sqrt{3}}}{\sqrt{4-3}} + 4$$

$$2\sqrt{2-\sqrt{3}} + 2\sqrt{2+\sqrt{3}} + 4 = \sqrt{8-2\sqrt{12}} + \sqrt{8+2\sqrt{12}} + 4$$

$$= \sqrt{6-\sqrt{2}} + \sqrt{6+\sqrt{2}} + 4$$

$$2\sqrt{6+4}$$

$$2 \times 2f(x) - 3f(-x) = 4x^2 - x$$

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

$$= -5f(x) - 20x^2 + x$$

$$f(x) = -4x^2 - \frac{x}{5}$$

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

$$x=0 \rightarrow 2f(0) = 3m-1 \rightarrow f(0) = 1/5m - 0/5 \quad 6/75$$

$$x=-2 \rightarrow 6f(0) = 16+2m+3m-1 \rightarrow f(0) = 1/5(4/5) - 0/5 = 6/25$$

$$16+5m-1 = 9m-3 \rightarrow 16-1+3=9m-m \rightarrow m = \frac{18}{4} = \frac{9}{2} = 4/5$$

$$f(x) + f\left(\frac{1}{x}\right) = \frac{3x^2 - 12x + 3}{x}$$

$$x=-1 \rightarrow f(-1) + f(-1) = \frac{3+12+3}{-1} = -18 = 2f(-1)$$

$$f(-1) = -9$$