

الف) $f(x) = \sqrt{\frac{x-1}{x}} - \frac{x}{x-1} \geq 0 \Rightarrow \frac{x^2 - 2x + 1 - x^2}{x(x-1)} \geq 0 \Rightarrow \frac{-2x+1}{x(x-1)} \geq 0$

$x \neq 0, x \neq 1$

ب) $x \neq -1, x \neq 0, x \neq 1, x \neq 2$

$P_f = (-\infty, 0) \cup [1/2, 1)$

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$3x+2+x-1 \neq 0 \Rightarrow 4x+1 \neq 0 \Rightarrow x \neq -1/4$

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

$P_f = \mathbb{R} - \{-2, -1, -1/4, 0, 1\}$

الف) $(1/3)^x - 2 \Rightarrow x = -2 \quad (32 - 4^x) \rightarrow 32 = 4^x \Rightarrow 2^5 = 2^{2x} \Rightarrow x = 2.5$

$P_f = (-\infty, -2] \cup [2.5, +\infty)$

ب) $4\sqrt{x-1} \Rightarrow x \geq 1$

$3 - \sqrt[4]{x-1} \geq 0 \Rightarrow 3 \geq \sqrt[4]{x-1} \Rightarrow x-1 \leq 81 \Rightarrow x \leq 82$

$P_f = [1, 82]$

$(x-2)(x+1) > 0$

$x^2 - 1 > 0 \Rightarrow x^2 > 1 \Rightarrow x > 1 \text{ or } x < -1$

$P_f = (-\infty, -1) \cup (2, +\infty)$

$-2, b \rightarrow \alpha\beta = \frac{c}{a} \Rightarrow -2b = 3 \Rightarrow b = 3/2$

$\alpha + \beta = -\frac{b}{a} \Rightarrow b - 2 = -\frac{1}{-1} = 1/2 \Rightarrow a$

$a + b = 3/2 - 1/2 = 2/2 = 1$

① $3x - 2 \geq x \Rightarrow 2x \geq 2 \Rightarrow x \geq 1$

② $2x + 3 \geq x \Rightarrow x \geq -3 \Rightarrow -3 \leq x < 1$

① $\cup$ ② $\Rightarrow P_f = [-3, +\infty)$

$$f(5) = (a+1)(5+2) = 7a+7$$

$$f(-2) = 3a+2(-2) = 3a-4$$

$$\Rightarrow 14a+14 = 3a-4+a \Rightarrow 14a+14 = 4a-4$$

$$\Rightarrow 10a = -18 \rightarrow a = -1.8$$

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

$$\Rightarrow 2\sqrt{2-\sqrt{3}} + 2\sqrt{2+\sqrt{3}} = x \Rightarrow x^2 = 4(2-\sqrt{3}) + 4(2+\sqrt{3}) + 8(1)$$

$$\Rightarrow 8-4\sqrt{3}+8+4\sqrt{3}+8 = A^2 \Rightarrow A^2 = 24 \Rightarrow A = \pm\sqrt{24} \Rightarrow A = \pm 2\sqrt{6}$$

$$x=x$$

$$\begin{cases} 2f(x) - 3f(-x) = 4x^2 - x \\ \end{cases}$$

$$\begin{cases} \cancel{2f(x)} - 3f(-x) = 4x^2 - x \\ 2f(-x) - 3f(x) = 4x^2 + x \end{cases}$$

$$\Rightarrow \begin{cases} 4f(x) - 6f(-x) = 8x^2 - 2x \\ 6f(-x) - 9f(x) = 12x^2 + 3x \end{cases} \Rightarrow \begin{cases} -5f(x) = 2x^2 + x \\ \Rightarrow f(x) = -\frac{2}{5}x^2 - \frac{1}{5}x \end{cases}$$

$$2f(0) = 3^m - 1 \rightarrow 6f(0) = 9^m - 1 \Rightarrow x=0$$

$$-6f(0) = 16 + 2m + 3m - 1 = -16 + 5m - 1 \Rightarrow x = -2$$

$$0 = 16 + 14m - 2 \Rightarrow 14m = -14 \Rightarrow 2f(0) = -4 \Rightarrow f(0) = -2$$

$$ax+b+\frac{a}{x}+b \Rightarrow \frac{ax^2+bx+a+bx}{x}$$

$$\Rightarrow \frac{ax^2+2bx+a}{x} = \frac{3x^2-12x+3}{x} \Rightarrow a=3 \quad b=-6$$

$$f(-1) = 3x-6 \Rightarrow f(-1) = -3-6 \rightarrow f(-1) = -9$$