

۱۹۵ آفرین

(الف) $\sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \rightarrow \sqrt{\frac{(x+1)(x-1) - x^2}{x(x-1)}}$

$\sqrt{\frac{-2x+1}{x(x-1)}} \rightarrow \frac{1}{2}$

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

$D_f = (-\infty, 0) \cup \left[\frac{1}{2}, +\infty\right)$

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

$\frac{1}{x-1} + \frac{1}{x+2} \neq 0 \rightarrow x(x+2) + (x-1) \neq 0$

$x^2 + 3x - 1 \neq 0$

$D_f = \mathbb{R} - \left\{-\frac{3}{2}, 1\right\}$

(الف) $f(x) = \sqrt{\left(\frac{1}{x}\right)^x - 9} (32 - 4^x) \geq 0$

$\left(\frac{1}{x}\right)^x - 9 = 0 \rightarrow x = -2$

$32 - 4^x = 0 \rightarrow 4^x = 32 \rightarrow x = \frac{5}{2}$

$D_f = (-\infty, -2] \cup \left[\frac{5}{2}, +\infty\right)$

(ب) $\sqrt{x-1} + \sqrt{y+1} = 3$

$D_f = [1, +\infty)$

$\sqrt{y+1} = 3 - \sqrt{x-1} \rightarrow \sqrt{y+1} \leq 3 \rightarrow y+1 \leq 9 \rightarrow y \leq 8$

$\sqrt{x-1} \geq 0 \rightarrow x-1 \geq 0 \rightarrow x \geq 1$

$D_f = [1, 8]$

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

$$\begin{cases} D(x^2 - x - 2) > 0 \rightarrow (x+1)(x-2) \\ \frac{-1}{+1-1} \rightarrow (-\infty, -1) \cup (2, +\infty) \end{cases} \quad (P)$$

$$D_f = (-\infty, -1) \cup (2, +\infty) \quad (P)$$

$$\sqrt{x^2 - 1} = 1 \rightarrow x^2 - 1 = 1 \rightarrow x^2 = 2$$

$$x = \pm\sqrt{2}$$

$$f(x) = \sqrt{2 + ax - x^2} \rightarrow D_f = [-a, b] \quad (P)$$

$$x = -2 \rightarrow 2 - 2a - 4 = 0 \rightarrow 2a = -2 \rightarrow a = -1$$

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

$$-(x - \frac{1}{4})(x + \frac{5}{2}) \rightarrow x = \frac{1}{4} \quad x = -\frac{5}{2} \rightarrow b = \frac{5}{2}$$

$$a + b = \frac{1}{2} - \frac{1}{2} = 0 \quad (P)$$

$$f(x) = \begin{cases} \sqrt{2x-2} & x \geq 1 \\ \sqrt{2x+2} & x < 1 \end{cases} \quad g(x) = \sqrt{f(x) - x} \geq 0 \quad (C)$$

$$f(x) \geq 1 \rightarrow \sqrt{2x-2} - x = \sqrt{2x-2} - x \geq 0 \rightarrow x-1 \geq 0 \rightarrow x \geq 1$$

$$f(x) < 1 \rightarrow \sqrt{2x+2} - x = \sqrt{2x+2} - x \geq 0 \rightarrow x \leq -1 \rightarrow -1 \leq x < 1$$

$$D_f = [-1, +\infty) \quad (P)$$

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$$f(x) = x^2 - f x \quad f\left(\sin \frac{\pi}{x} + \cos 2\pi\right) = ? \quad (9)$$

$$f\left(\frac{\sqrt{x}}{x} + 1\right) = ? \rightarrow f\left(\frac{\sqrt{x}}{x} + 1\right)^2 - f\left(\frac{\sqrt{x}}{x} + 1\right) = \sqrt{x}$$

$$f\left(\frac{x}{x} + 1 + \sqrt{x}\right) = 2\sqrt{x} - x \rightarrow \frac{x}{x} + 2\sqrt{x} - 2\sqrt{x} - x = x$$

$$\rightarrow \frac{-1}{x} \quad \text{D}$$

$$f(f(a)) = a \quad f(x) = \frac{x+1}{x-1} \quad (10)$$

$$\rightarrow f(a) = \frac{a+1}{a-1}$$

$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} \rightarrow \frac{a+1+1}{a+1-1} = \frac{2a}{a-1}$$

$$2 \text{ (جواب)} : \frac{2}{a-1} \rightarrow f(f(a)) = \frac{2a}{a-1} = a \rightarrow a \in \mathbb{R} - \{1\}$$

$$f(x) = x^2 - f x \quad g(x) = \sqrt{x^2 - 1} \quad (11)$$

$$f(g(a)) = -x$$

$$x = g(a) \rightarrow g(a)^2 - f g(a) = -x \rightarrow (g(a) - x)^2 = 0$$

$$g(a) = x$$

$$\sqrt{a^2 - 1} = x \rightarrow a^2 - 1 = x^2 \rightarrow a = \pm \sqrt{x^2 + 1}$$

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$$f(n+3) = n^2 - \omega n + 4$$

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$$f(r) \times f(-r) = ? \rightarrow r \times -vr = -1rf$$

$$n=1 \rightarrow f(r) = r$$

$$n=-4 \rightarrow f(-r) = vr$$

$$f(r \cos^2 n + \omega \cos n) = \tan^2 n$$

(1.)

$$f(r, \omega) = ?$$

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$$r\omega = \frac{v}{r}$$

$$(r \cos^2 n + \omega \cos n = \frac{v}{r}) \times r \rightarrow r \cos^2 n + 1 \cdot \cos n - v = 0$$

$$(r \cos n - r)(r \cos n + v) = 0$$

$$\cos n = \frac{1}{r} \text{ or } \cos n = -\frac{v}{r}$$

$$\tan^2 n = \frac{1}{\cos^2 n} - 1 \rightarrow \tan(r, \omega) = r$$

$$\text{ب-2) } \sqrt{x-1} + \sqrt{y+1} = 3, \quad \sqrt{y+1} = 3 - \sqrt{x-1} \rightarrow \sqrt{x-1} \geq 0 \rightarrow x \geq 1$$

$$I, II \rightarrow 1 \leq n \leq 17 \rightarrow DP = [1, 17]$$

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