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مسئله ۱۰۰

مسئله ۱۰۱

$$\sqrt{f(n) - n} \geq 0$$

الف) $n \geq 1$

$$\begin{aligned} r(n-r-n) &\geq 0 \\ r(n-r) &\geq 0 \\ rn &\geq r \\ n &\geq 1 \end{aligned}$$

(n < 1)

$$\begin{aligned} rn+r-n &= n+r \\ n+r &\geq 0 \\ n &\geq -r \\ -r \leq n < 1 \end{aligned}$$

$$D_f = [-r, +\infty)$$

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(مسئله ۱۰۲)

$$\begin{aligned} r(a+r)(a+r) &= ra-r+a \\ f(a+r) &= fa-r \end{aligned}$$

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$$f(a-1) = f(a-1)$$

$$10a = -11 \rightarrow a = -\frac{11}{10} = -1.1$$

(مسئله ۱۰۳)

 $n > 0$

$$\sqrt{r+r} = \frac{\sqrt{r+1}}{\sqrt{r}}$$

$$\sqrt{r-r} = \frac{\sqrt{r}-1}{r}$$

$$\begin{aligned} f(r+\sqrt{r}) &= \sqrt{r}+r \\ f(r-\sqrt{r}) &= \sqrt{r}+r \end{aligned}$$

$$\sqrt{n} + \frac{1}{\sqrt{n}} = \frac{\sqrt{r}+\sqrt{r}}{r} + \frac{\sqrt{r}-\sqrt{r}}{r} = \sqrt{r}$$

$$f(r+\sqrt{r}) + f(r-\sqrt{r}) = r(\sqrt{r}+r) = r\sqrt{r}+r$$

$$\begin{aligned} r f(n) - r f(-n) &= r n^r - n \\ r f(-n) - r f(n) &= r n^r + n \end{aligned}$$

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$$\begin{aligned} r f(n) &= r n^r + n \\ f(n) &= \frac{r n^r + n}{r} \end{aligned}$$

(مسئله ۱۰۴)

$$\begin{aligned} n \rightarrow (r) f(n) &= r n - 1 \rightarrow r f(0) = r n - 1 \\ n \rightarrow r \rightarrow f(0) &= r + r n + r n - 1 \end{aligned}$$

$$f(0) = \frac{r n - 1}{r}$$

$$n \rightarrow -r \rightarrow f(n) = \frac{10 + 0m}{r}$$

$$\frac{10 + 0m}{r} = \frac{r n - 1}{r} \rightarrow m = \frac{4}{r}$$

$$f(0) = \frac{10}{r}$$

$$f\left(\frac{1}{n}\right) + f\left(\frac{1}{n}\right) = (an+b) + \left(a \cdot \frac{1}{n} + b\right) = an+b + \frac{a}{n} + b = an + \frac{a}{n} + 2b$$

$$an + \frac{a}{n} + 2b = r n^r - 1 + r n + r$$

$$an = r \neq 0$$

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

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14, 10

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تکلیف

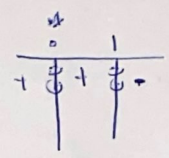
در مسائل

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

$D_f = (-\infty, 0) \cup (0, 1)$

مسئله 1

$\frac{x^2 - x^0}{x(x-1) - x^2} \geq 0$



$0 \quad \frac{1}{x} \quad 1$
 $+\quad -\quad +\quad -$

$D_f = (-\infty, 0) \cup (\frac{1}{x}, 1)$

ب) $\frac{1}{x+1} - \frac{2}{x} \geq 0$

$D_f = \mathbb{R} - \{ -1, 0, 1, -\frac{1}{2} \}$

$\frac{x}{x-1} + \frac{1}{x+1} \neq 0 \quad x \neq -\frac{1}{2}$

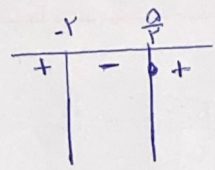
$f(x) = \sqrt{(\frac{1}{x})^2 - 9} (xy - x^2) \geq 0$

مسئله 2

الف)

$\frac{1}{x} - 9 \geq 0$
 $\frac{1}{x} \geq 9$
 $x \leq -\frac{1}{9}$

$xy - x^2 \geq 0$
 $xy \geq x^2$
 $x = \frac{y}{x}$



$(-\infty, -\frac{1}{9}] \cup [\frac{1}{9}, +\infty)$

ب) $\sqrt{x-1} + \sqrt{y+1} = 3$

$\sqrt{y+1} = 3 - \sqrt{x-1} \geq 0$

$x-1 \geq 0 \quad y+1 \geq 0$
 $x \geq 1 \quad y \geq -1$

$\sqrt{x-1} \leq 3 \rightarrow x-1 \leq 9 \rightarrow x \leq 10$
 $x = [1, 10]$

مسئله 3

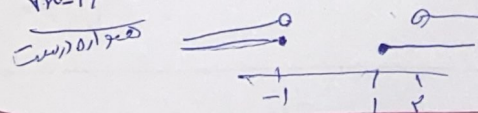
$x^2 - x - 2 > 0$
 $(x+1)(x-2) > 0$

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

II $\sqrt{x-1} + 1 \neq 0$
 $\sqrt{x-1} \neq -1$

II $\sqrt{x-1} \geq 0$
 $x-1 \geq 0$
 $x \geq 1$
 $x \leq 1$

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



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

مسئله 4

$\sqrt{4ax - 2x} \geq 0$

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

$1 + \frac{1}{x} - x^2 = 0$
 $1 = x^2$
 $x = \pm 1$

$b = \frac{a + \sqrt{a^2 + 1}}{x} = \frac{-\frac{1}{x} + \sqrt{\frac{1}{x^2} + 1}}{x} = \frac{-\frac{1}{x} + \frac{\sqrt{1+x^2}}{x}}{x} = \frac{-1 + \sqrt{1+x^2}}{x^2} = 6$
 $\boxed{\frac{x}{x^2} - \frac{1}{x^2} = 1}$