

تکلیف ۴

نام و نام خانوادگی: پویا یوسفیان

دوره ۳

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$$الف) y = \sqrt{\frac{x^2 - 6x}{x^2 - x}} \rightarrow \frac{x^2 - 6x}{x^2 - x} \geq 0 \rightarrow \frac{x(x-6)}{x(x-1)(x+1)} \geq 0$$

x	-1	0*	1	6
y	$-\frac{6}{0} + \frac{6}{0} + \frac{6}{0} - 0 +$			

$$D_f = (-1, 0) \cup (0, 1) \cup [6, +\infty)$$

$$ب) y = \sqrt{\frac{x^6 - x^3}{x^3 - x}} \rightarrow \frac{x^3(x-1)(x+1)}{x(x-1)(x+1)} = x^2 \rightarrow y = \sqrt{x^2} = |x|$$

شرط، اعداد صحیح ندارد.

$$\rightarrow x(x+1)(x-1) \neq 0 \rightarrow x \neq 1, x \neq 0, x \neq -1$$

$$D_f = \mathbb{R} - \{-1, 0, 1\} \quad \text{✓}$$

$$الف) y = \frac{x+1}{\sqrt{x+1x}} \rightarrow x+|x| > 0 \quad \begin{matrix} x < 0 \rightarrow x-x=0 \\ x > 0 \rightarrow 2x > 0 \\ x=0 \rightarrow 0 \end{matrix} \quad D_f = (0, +\infty)$$

$$ب) y = \frac{1}{\sqrt{x|x|}} \rightarrow x|x| > 0 \quad \begin{matrix} x > 0 \rightarrow x^2 > 0 \\ x < 0 \rightarrow -x^2 < 0 \\ x=0 \rightarrow 0 \end{matrix} \quad D_f = (0, +\infty)$$

$$الف) y = \sqrt{2-[x]} \rightarrow 2-[x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3$$

$$D_f = (-\infty, 3)$$

$$ب) y = \frac{1}{\sqrt{2-[x]}} \rightarrow 2-[x] > 0 \rightarrow [x] < 2 \rightarrow x < 2 \quad D_f = (-\infty, 2)$$

$$الف) y = \sqrt{\left[x - \frac{1}{x}\right] + \left[x + \frac{1}{x}\right]} \rightarrow \left[x + \frac{1}{x}\right] = \left[x - \frac{1}{x} + 1\right] = \left[x - \frac{1}{x}\right] + 1 \quad \text{①}$$

$$\text{①} \rightarrow \sqrt{2\left[x - \frac{1}{x}\right] + 1} \xrightarrow{\text{برای صحت}} \left[x - \frac{1}{x}\right] \geq 0 \rightarrow x - \frac{1}{x} \geq 0$$

$$x > \frac{1}{x} \quad \leftarrow$$

$$D_f = \left[\frac{1}{x}, +\infty\right) \quad \text{✓}$$

$$ب) y = \sqrt{\left[x - \frac{1}{x}\right] + \left[-x + \frac{1}{x}\right]} \quad a = x - \frac{1}{x} \rightarrow \sqrt{[a] + [-a]}$$

$$a \in \mathbb{Z} \rightarrow x - \frac{1}{x} = k \rightarrow x = k + \frac{1}{x} \rightarrow D_f = \left\{k + \frac{1}{x} \mid k \in \mathbb{Z}\right\}$$

الف) $y = \frac{r}{\sin x - 1} \rightarrow \sin x - 1 \neq 0 \rightarrow \sin x \neq 1 \rightarrow x \neq 2k\pi + \frac{\pi}{2}$

$D_f = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{2} \mid k \in \mathbb{Z} \right\}$ (ب) ✓

ب) $y = \frac{r}{r \sin^2 x - 1} \rightarrow r \sin^2 x - 1 \neq 0 \rightarrow \sin^2 x \neq \frac{1}{r} \rightarrow \sin x \neq \pm \sqrt{\frac{1}{r}}$

$D_f = \mathbb{R} - \left\{ \frac{k\pi}{r} + \frac{\pi}{2} \mid k \in \mathbb{Z} \right\}$ ✓

الف) $y = \sqrt{r \sin x - 1} \rightarrow r \sin x - 1 \geq 0 \rightarrow \sin x \geq \frac{1}{r} \rightarrow \frac{2k\pi + \frac{\pi}{6}}{r} \leq x \leq \frac{5\pi}{6} + 2k\pi$

$D_f = \left[2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6} \right] \quad (k \in \mathbb{Z})$

ب) $y = \sqrt{\cos x - 1} \rightarrow \cos x - 1 \geq 0 \rightarrow \cos x \geq 1 \xrightarrow{-1 \leq \cos x \leq 1}$

$\cos x = 1 \rightarrow x = 2k\pi$

$D_f = \{ 2k\pi \mid k \in \mathbb{Z} \}$ ✓

الف) $\cos y = |x| - r \xrightarrow{-1 \leq \cos y \leq 1} -1 \leq |x| - r \leq 1 \rightarrow r \leq |x| \leq r+1$

$D_f = [-r, -r+1] \cup [r, r+1]$

ب) $y = \arcsin(x^2 + 2x + 1) \rightarrow -1 \leq x^2 + 2x + 1 \leq 1$

$\xrightarrow{\text{الاول}} x^2 + 2x + 1 \geq -1 \rightarrow x^2 + 2x + 2 \geq 0 \rightarrow (x+1)(x+2) \geq 0$

$\rightarrow x \leq -2 \vee x \geq -1$

$\xrightarrow{\text{الثاني}} x^2 + 2x + 1 \leq 1 \rightarrow x^2 + 2x \leq 0 \xrightarrow{\text{I.V.B}} x(x+2) \leq 0$

$\rightarrow -2 \leq x \leq 0$

$D_f = [-2, -1] \cup [-1, 0]$

الف) $y = \sqrt{r - \log_p(x-r)}$

$\log_p(x-r) \begin{cases} x-r > 0 \rightarrow x > r \\ r > 0 \\ r \neq 1 \end{cases}$

$\rightarrow r - \log_p(x-r) \geq 0 \rightarrow \log_p(x-r) \leq r \rightarrow x-r \leq r^r \rightarrow x-r \leq 9$

$\rightarrow x \leq 11 \xrightarrow{\text{بـ}} r < x \leq 11$

$D_f = (r, 11]$ ✓

ب) $y = \log(x^3 - x) \rightarrow x^3 - x > 0 \rightarrow x(x+1)(x-1) > 0$

CLASS MEMO

$x \quad -1 \quad 0 \quad 1$

$y \quad - \quad 0 \quad + \quad 0 \quad - \quad 0 \quad +$

$D_f = (-1, 0) \cup (1, +\infty)$ ✓

$$الف) y = \frac{r}{r^x + 1} \rightarrow r^x + 1 \neq 0 \xrightarrow{r^x > 0} D_f = \mathbb{R}$$

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$$ب) y = \frac{r}{r^x - 1} \rightarrow r^x - 1 \neq 0 \rightarrow r^x \neq 1 \rightarrow x \neq 0 \rightarrow D_f = \mathbb{R} - \{0\}$$

$$ج) y = \frac{r}{r^x - r} \rightarrow r^x - r \neq 0 \rightarrow r^x \neq r \xrightarrow{r^{\frac{1}{r}} = r} x \neq \frac{1}{r}$$

$$D_f = \mathbb{R} - \left\{ \frac{1}{r} \right\}$$

$$د) y = \frac{r}{r^x - r} \rightarrow r^x - r \neq 0 \rightarrow r^x \neq r \rightarrow x \neq \log_r r$$

$$D_f = \mathbb{R} - \{ \log_r r \}$$

$$هـ) y = (r^x + 1)! \rightarrow r^x + 1 \in \mathbb{W} \rightarrow x \in \frac{\mathbb{W} - 1}{r}$$

$$D_f = \left\{ \frac{k - 1}{r} \right\}, k \in \mathbb{W}$$

$$و) y = \left(\frac{r^x - r}{r^x - r} \right)! \rightarrow \frac{r^x - r}{r^x - r} \in \mathbb{W} \rightarrow r^x - r \in \mathbb{W} \rightarrow r^x - r = k \rightarrow r^x = k + r$$

$$\rightarrow r^x - r = k \rightarrow r^x = k + r \rightarrow x = \log_r (k + r)$$

$$D_f = \left\{ \log_r (k + r) \right\}, k \in \mathbb{W}$$