

سوال ۱

$$rx^r + y^r - rx + y + k = 0 \xrightarrow{k=a+b} rx^r - rx + a = -(y^r + y + b) \rightarrow r(x-1)^r = -(y+1)^r \rightarrow x=1, y=-1$$

$$\rightarrow a+b = 1+r = \boxed{11 \rightarrow k}$$

سوال ۲

$$f(x) = \begin{cases} x^r + rx & : x \geq a \\ rx + a + r & : x \leq a \end{cases} \Rightarrow a^r + ra = ra + r \rightarrow a^r + a - r = 0 \rightarrow (a+r)(a-1) = \begin{cases} a = -r \\ a = 1 \end{cases}$$

$$f(x) = \begin{cases} x^r + rx & : x \geq 1 \\ rx + r & : x \leq 1 \end{cases} \rightarrow 1 + r = 1 + r = 0 \rightarrow \boxed{f(1) = 0}$$

سوال ۳

$$f(x) = \begin{cases} rx^r - b & : |x+1| \geq r \\ a + rx & : -r \leq x \leq -1 \end{cases} \xrightarrow{x+1 \geq r \rightarrow x \geq 1} \xrightarrow{x+1 \leq -r \rightarrow x \leq -r-1} \xrightarrow{x=-r} \Rightarrow 11 - b = a - 9 \rightarrow \boxed{a+b = 20}$$

سوال ۴

$$y = \sqrt{4x-a} + \sqrt{b-3x} \rightarrow 4x-a \geq 0 \quad 4x \geq a \quad x \geq \frac{a}{4}$$

$$b-3x \geq 0 \quad 3x \leq b \quad x \leq \frac{b}{3}$$

$$Dy = \{r\} \quad \cap \rightarrow Dy = \{r\} \quad r = \frac{a}{4} = \frac{b}{3}$$

$$\begin{matrix} a=12 \\ b= \end{matrix} \quad \boxed{\frac{b}{a} = \frac{4}{12} = \frac{1}{3}}$$

سوال ۵
 الف) $y = \sqrt{\frac{x+1}{|x-1|}} + \sqrt{\frac{4-x}{x^2+rx+r}} \rightarrow \Delta \geq 0 \quad \oplus \text{---}$

ب) $y = \sqrt{[x]-r} + \sqrt{r-[x]}$

① $\frac{-1}{0} + \frac{r}{0} +$ ② $\frac{4}{+} + \frac{-}{0}$

① $\cap$ ② $\Rightarrow Dy = \emptyset$

① $\cap$ ② $\Rightarrow Dy = [-1, 4] - \{r\}$

سوال ۶
 الف) $y = \sqrt{\frac{x^2-x-4}{x^2-11x^r+34}} = \sqrt{\frac{(x-1)(x+4)}{(x-1)(x+1)(x+2)(x-2)}} \rightarrow \begin{matrix} -r & -r^* & r & r^* \\ + & - & - & + \\ 0 & 0 & 0 & 0 \end{matrix} \rightarrow Dy = (-\infty, -1) \cup (1, 2) \cup (2, +\infty)$

ب) $y = \sqrt{\frac{x^2-rx^r-2x+4}{x^2+rx^r-2x-4}} \rightarrow a+b+c+d=0 \rightarrow x=1$

$$\rightarrow \sqrt{\frac{(x-1)(x-2)(x+2)}{(x+1)(x+1)(x-2)}} \quad \begin{matrix} -r & -r & -1 & 1 & r & r \\ + & - & + & - & + & - \\ 0 & 0 & 0 & 0 & 0 & 0 \end{matrix}$$

$$\begin{array}{r|l} x^2-rx^r-2x+4 & x-1 \\ \hline -(x^2-\lambda^r) & x^2-x-4 \\ \hline -x^2-2x+4 & \\ \hline -(-x^2+\lambda) & \\ \hline -4x+4 & \\ \hline -(-4x+4) & 0 \end{array} \quad \begin{array}{r|l} x^2+rx^r-2x-4 & x+1 \\ \hline -(x^2+\lambda^r) & x^2+x-4 \\ \hline x^2-2x & \\ \hline -(x^2+\lambda) & \\ \hline -4x-4 & \\ \hline -(-4x-4) & 0 \end{array} \rightarrow Dy = (-\infty, -1) \cup [-1, 1) \cup [1, 2) \cup (2, +\infty)$$

ii) $\sqrt{[-x]-r} \geq 0 \quad [-x] \geq r \rightarrow -x \geq r \rightarrow x \leq -r \rightarrow D_y = (-\infty, -r]$

(سوال 1)

ب) $\frac{2x^2+4}{[x]^2-2[x]-3} \rightarrow ([x]^2-3)([x]+1) \quad [x] \neq 3 \rightarrow x \neq [3, 4)$
 $[x] \neq -1 \rightarrow x \neq [-1, 0) \rightarrow D_y = \mathbb{R} - [-1, 0) \cup [3, 4)$

iii) $\frac{\cot x + 1}{\tan x + 1} \quad \cot x = \frac{\cos x}{\sin x} \neq 0 \quad \tan x + 1 \neq 0 \rightarrow \tan x \neq -1 \rightarrow x \neq \frac{3\pi}{4}$
 $\tan x = \frac{\sin x}{\cos x} \neq 0 \quad D_y = \mathbb{R} - \left\{ \frac{\pi}{4}, k\pi + \frac{3\pi}{4} \right\}$



(سوال 1)

ب) $\sqrt{1-\sin^2 x} = (1+\sin x)(1-\sin x) \leq 0$

$\frac{+}{-} \frac{+}{-}$



$D_y = \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$

iii) $y = \sqrt{1 - \log_{\frac{1}{x}} x} \geq 0 \quad \log_{\frac{1}{x}} x \leq 1 \quad x-1 \geq \frac{1}{x} \rightarrow \boxed{x \geq \frac{1}{x}} \rightarrow D_y = \left[\frac{1}{x}, +\infty \right)$
 $x-1 > 0 \rightarrow x > 1$

(سوال 1)

ب) $y = \frac{\sqrt{x^2-x}}{1 - \log_{\frac{x^2-x}{x}} x} \rightarrow x(x-1) \geq 0 \quad \frac{0}{+} \frac{1}{-}$
 $\log_{\frac{x^2-x}{x}} x \neq 1 \rightarrow \frac{x^2-x}{x} \neq x \rightarrow x^2-x-x \neq 0 \rightarrow x^2-2x \neq 0 \rightarrow x(x-2) \neq 0$
 $x^2-x > 0 \quad x(x-1) > 0 \rightarrow \frac{+}{-} \frac{+}{-} \quad (x-2)(x+1) \neq 0 \rightarrow \frac{+}{-} \frac{+}{-}$
 $\rightarrow D_y = \mathbb{R} - (-\infty, 0) \cup (2, 4) \cup (4, +\infty)$

iii) $\sqrt{\frac{x^2-x^2}{x^2-x}} \geq 0 \rightarrow x^2-x^2 \geq 0 \rightarrow x^2-x \leq 0 \quad (x-1)(x-2) \leq 0$
 $\frac{1}{+} \frac{2}{-}$
 $D_y = [1, 2]$

(سوال 1)

ب) $y = \left(\frac{x^2+2}{x^2+x} \right)!$ $\frac{x^2+2}{x^2+x} \in \mathbb{N} \rightarrow x = -\frac{x^2+2}{x^2+x} \rightarrow D_y = \{x \mid x = \frac{-x^2+2}{x^2+x}, k \in \mathbb{N}\}$