

الف

$$y = \frac{x+3}{2x^3+9x^2+10x+3} \rightarrow \text{جایگزینی } x+1$$

$$y = \frac{x+3}{(x+1)(2x+1)(x+3)} \rightarrow D = \mathbb{R} - \left\{-1, -\frac{1}{2}, -3\right\}$$

ب

$$y = \frac{x+3}{2x^3+3x^2-8x+3} \rightarrow \text{صورت را به صورت ضرب می‌نویسیم}$$

$$y = \frac{x+3}{(x-1)(2x^2+5x-3)} = \frac{x+3}{(x-1)(x+3)(2x-1)}$$

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

الف

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

همواره مثبت
زیاد: $\Delta < 0$ و $\Delta > 0$

$$D = (-\infty, -3] \cup (1, +\infty)$$

ب

$$y = \frac{x+3}{x^3-2x^2+2x-1} = \frac{x+3}{(x-1)(x^2-x+1)}$$

$$D = \mathbb{R} - \left\{\text{ریشه مخرج}\right\}$$

$$D = \mathbb{R} - \{1\}$$

مخرج نباید صفر شود:

$$y = \frac{2}{x^2-5|x-1|-2x+5}$$

$$x^2-2x+5 = 5|x-1|$$

$$\begin{cases} x \geq 1 \rightarrow x^2-2x+5 = 5x-5 \rightarrow x^2-7x+10=0 \\ (x-5)(x-2)=0 \end{cases} \rightarrow \begin{cases} x=2 \\ x=5 \end{cases}$$

$$\begin{cases} x < 1 \rightarrow x^2-2x+5 = -5x+5 \rightarrow x^2+3x=0 \\ x(x+3)=0 \end{cases} \rightarrow \begin{cases} x=0 \\ x=-3 \end{cases}$$

$$D = \mathbb{R} - \{0, -3, 2, 5\}$$

ب

$$y = \frac{5x^2+4}{[x]^2-2[x]-3}$$

مخرج نباید صفر شود:

$$[x]^2-2[x]-3 \neq 0 \rightarrow ([x]-3)([x]+1) \neq 0$$

$$\begin{cases} [x] \neq 3 \rightarrow x \notin [3, 4) \\ [x] \neq -1 \rightarrow x \notin [-1, 0) \end{cases} \rightarrow D = (-\infty, -1) \cup [4, +\infty)$$

الف

$$y = \sqrt{[-x]-2}$$

$$[-x]-2 \geq 0 \rightarrow [-x] \geq 2 \rightarrow -x \geq 2 \rightarrow x \leq -2 \rightarrow D = (-\infty, -2]$$

$$[0, 3) \cup [4, +\infty)$$

ب

$$y = \sqrt{\left[x-\frac{1}{3}\right] + \left[\frac{1}{3}-x\right]}$$

$$\begin{cases} [t] + [-t] \rightarrow t \in \mathbb{Z} \rightarrow 0 \checkmark \geq 0 \\ t \in \mathbb{R} - \mathbb{Z} \rightarrow -1 < 0 \end{cases}$$

$$t \in \mathbb{Z} \rightarrow x - \frac{1}{3} \in \mathbb{Z} \rightarrow x \in \mathbb{Z} + \frac{1}{3}$$

$$D = \left\{x \mid x = k + \frac{1}{3}, k \in \mathbb{Z}\right\}$$

الف

$$y = \sqrt{\left[x-\frac{1}{3}\right] + \left[x+\frac{2}{3}\right]} \geq 0$$

می‌توانیم اعداد صحیح را از برکت خارج یابیم و برکت وارد کنیم:

$$\left[x-\frac{1}{3}\right] + \left[x+\frac{2}{3}\right] + 1 \geq 1$$

$$2\left[x+\frac{2}{3}\right] \geq 1 \rightarrow \left[x+\frac{2}{3}\right] \geq \frac{1}{2}$$

$$x + \frac{2}{3} \geq 1 \rightarrow x \geq \frac{1}{3} \rightarrow D = \left[\frac{1}{3}, +\infty\right)$$

$$y = \sqrt{1 - r \sin^2 x}$$

$$1 - r \sin^2 x \geq 0 \rightarrow r \sin^2 x \leq 1 \rightarrow \sin^2 x \leq \frac{1}{r}$$

$$-\frac{1}{\sqrt{r}} \leq \sin x \leq \frac{1}{\sqrt{r}}$$



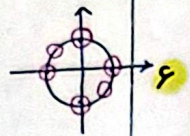
$$D = \left[2k\pi - \frac{\pi}{4}, 2k\pi + \frac{\pi}{4} \right] \cup \left[2k\pi + \frac{3\pi}{4}, 2k\pi + \frac{5\pi}{4} \right]$$

$$y = \frac{\cot x + 1}{\tan x + 1}$$

$$\cot x = \frac{\cos x}{\sin x} \rightarrow \sin x \neq 0$$

$$\tan x = \frac{\sin x}{\cos x} \rightarrow \cos x \neq 0$$

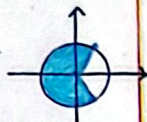
$$\tan x \neq -1 \rightarrow D = \mathbb{R} - \left\{ \frac{k\pi}{2}, k\pi - \frac{\pi}{4} \right\}$$



$$y = \sqrt{1 - r \cos x}$$

$$1 - r \cos x \geq 0 \rightarrow r \cos x \leq 1 \rightarrow \cos x \leq \frac{1}{r}$$

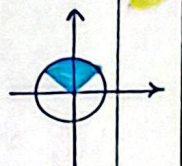
$$D = \mathbb{R} - \left(2k\pi - \frac{\pi}{3}, 2k\pi + \frac{\pi}{3} \right)$$



$$y = \sqrt{r \sin x - 1}$$

$$r \sin x - 1 \geq 0 \rightarrow r \sin x \geq 1 \rightarrow \sin x \geq \frac{1}{r}$$

$$D = \left[2k\pi + \frac{\pi}{4}, 2k\pi + \frac{5\pi}{4} \right]$$



$$\cos y = \sqrt{a - rx}$$

$$a - rx \geq 0 \rightarrow rx \leq a \rightarrow x \leq \frac{a}{r} *$$

$$-1 \leq \sqrt{a - rx} \leq 1 \rightarrow a - rx \leq 1 \rightarrow r \leq rx \rightarrow x \geq \frac{r}{r} = 1$$

$$D = [1, \frac{a}{r}]$$

$$y = \arcsin(x^2 + 3x + 1)$$

$$-1 \leq x^2 + 3x + 1 \leq 1$$

$$\begin{aligned} x^2 + 3x + 1 &\leq 0 & \frac{-3}{2} &\leq x &\leq \frac{-1}{2} \\ x^2 + 3x + 1 &\geq 0 & \frac{-3}{2} &\leq x &\leq \frac{-1}{2} \end{aligned}$$

$$D = \left[-\frac{3}{2}, -\frac{1}{2} \right]$$

$$y = \log_r \left(1 - \log_{\frac{x}{r}} \right) > 0 \rightarrow x > 0$$

$$1 - \log_{\frac{x}{r}} > 0 \rightarrow \log_{\frac{x}{r}} < 1 \rightarrow x > \frac{1}{r}$$

$$D = \left(\frac{1}{r}, +\infty \right)$$

$$y = \log_r \left(1 - \log_{\frac{x}{r}} \right) > 0 \rightarrow x > 0 \quad (I)$$

$$1 - \log_{\frac{x}{r}} > 0 \rightarrow \log_{\frac{x}{r}} < 1 \rightarrow x < r \quad (II)$$

$$(I) \cap (II) \rightarrow 0 < x < r \rightarrow D = (0, r)$$

$$y = \left(\frac{rx + a}{rx + r} \right)!$$

$$\frac{rx + a}{rx + r} \in \mathbb{W} \rightarrow x \in \frac{-rk + a}{r - r}$$

$$D = \left\{ x \mid x = \frac{-rk + a}{r - r}, k \in \mathbb{W} \right\}$$

$$y = \sqrt{rx - x^2}$$

$$rx - x^2 \geq 0 \rightarrow x \geq 0$$

$$rx - x^2 \geq r \rightarrow x^2 - rx + r \leq 0 \rightarrow (x - 1)(x - r) \leq 0$$

$$D = [1, r]$$