

$$d) y = \frac{2x+1}{2x^3+3x^2-12x+1}$$

مجموع ضرایب مقخرج برابر صفر است پس بر ۱-۲
 مقخرج کسری باید مخالف صفر باشد

$$2x^3+3x^2-12x+1=0 \rightarrow 2x^3+3x^2-12x+1=0$$

$$(2x-1)(x^2+6x-13)=0$$

$$① x-1=0 \rightarrow x=1$$

$$② 2x^2+6x-13=0 \rightarrow x^2+3x-6.5=0 \rightarrow (2x+6)(x-1)=0$$

$$x = -\frac{3}{2} = -1.5$$

$$x = \frac{1}{2}$$

$$③ Df = IR - \left\{ -\frac{3}{2}, \frac{1}{2}, 1 \right\}$$

$$y = \frac{x+1}{x^2+9x+10} \xrightarrow[\text{صفر باشد}]{\text{مخرج کسر را به صورت حاصل}} \frac{x+1}{x^2+9x+10} \rightarrow 2x^2+9x+10x+1=0$$

$$\xrightarrow[\text{برابر است پس بر } x+1 \text{ بخشیم}]{\text{تقسیم بر } x+1} (x+1)(2x+7x+1)=0$$

$$\textcircled{1} x+1=0 \rightarrow x=-1$$

$$\textcircled{2} 2x^2+9x+10=0 \xrightarrow{\text{مخرج کسر را به صورت حاصل}} x^2+9x+10=0 \rightarrow (x+6)(x+1)=0$$

$$\left. \begin{array}{l} x=-6 \\ x=-1 \end{array} \right\} \textcircled{1} \textcircled{2} \rightarrow D_f = \mathbb{R} - \left\{ -6, -1 \right\}$$

$y = \frac{2x+1}{2x^2-2x+1}$ مجموع ضرایب مقعده برابر صفر است. $\rightarrow 2x^2 - 2x + 1 = 0$
مخرج کسر را به مقلات تقسیم بر 1-x $\rightarrow (x-1)(2x^2-2x+1)=0$
صفر باشد در 1-x $\rightarrow x-1=0 \rightarrow x=1$
در 2x^2-2x+1=0 $\rightarrow \Delta = b^2 - 4ac = 1 - 4 = -3 < 0 \rightarrow \Delta < 0 \rightarrow$ ریشه حقیقی ندارد $\rightarrow D_p = \mathbb{R} - \{1\}$

$$\begin{aligned} \text{c) } y &= \frac{\sqrt{x^2 + 1}}{\sqrt{x^2 - 1} \sqrt{x^2 + 1}} \rightarrow \frac{x + 1}{x^2 - 1} \geq 0 \xrightarrow[\text{(*)}]{\substack{\text{Df: } x^2 - 1 \neq 0 \\ \text{Zf: } x^2 - 1 = 0}} \frac{x}{x^2 - 1} \rightarrow D_p = (-\infty, -1] \cup (1, +\infty) \\ \rightarrow x^2 - 1 &= 0 \xrightarrow{\substack{\text{Zf: } x^2 - 1 = 0 \\ \text{Df: } x^2 - 1 \neq 0}} (x-1)(x+1) = 0 \rightarrow \left. \begin{array}{l} x-1=0 \rightarrow x=1 \\ x^2 - 1 = 0 \rightarrow \Delta = 1 - 4 = -3 < 0 \end{array} \right\} \rightarrow x=1 \text{ (*)} \end{aligned}$$

$y = \frac{p}{x^2 - \omega|x-1| - 2x + \omega}$ ابتدا ضابطه بندی میکنیم $\rightarrow \begin{cases} x \geq 1 \rightarrow x^2 - \omega x + \omega - 2x + \omega = x^2 - (2+\omega)x + 2\omega \\ x < 1 \rightarrow x^2 + \omega x - \omega - 2x + \omega = x^2 + (\omega-2)x \end{cases}$
 (مشق) متوجه نباید صفر شود $\rightarrow \begin{cases} x \geq 1 \rightarrow x^2 - (2+\omega)x + 2\omega = 0 \rightarrow (x-1)(x-\omega) = 0 \rightarrow \begin{cases} x=1 \\ x=\omega \end{cases} \\ x < 1 \rightarrow x^2 + (\omega-2)x = 0 \rightarrow x(x+\omega-2) = 0 \rightarrow \begin{cases} x=0 \\ x=2-\omega \end{cases} \end{cases}$
 $\rightarrow D_f = \mathbb{R} - \{1, 0, 2, \omega\}$

$$\text{Def } y = \sqrt{[-x] - 1} \rightarrow [-x] \geq 1 \rightarrow -x \geq 1 \rightarrow x \leq -1 \rightarrow D_f = (-\infty, -1]$$

$$\text{ب) } y = \frac{5x^2 + 6}{[x]^2 - 2[x] - 3} \xrightarrow[\text{صفر باشد}]{\text{مخرج کسر باید مخالف}} [x]^2 - 2[x] - 3 = 0 \rightarrow ([x] - 3)([x] + 1) = 0$$

$$\rightarrow \left\{ \begin{array}{l} [x] = 3 \rightarrow x = [3, 4) \\ [x] = -1 \rightarrow x = [-1, 0) \end{array} \right\} \rightarrow D_f = (-\infty, -1) \cup [0, 3) \cup [4, +\infty)$$

$$\begin{aligned} \text{c) } y \sqrt{x - \frac{1}{x}} + \left[x + \frac{1}{x}\right] &\rightarrow \left[x - \frac{1}{x}\right] + \left[x + \frac{1}{x}\right] \geq 0 \rightarrow \left[x - \frac{1}{x}\right] + \left[x - \frac{1}{x} + 1\right] \geq 0 \\ &\rightarrow 1 + \left[x - \frac{1}{x}\right] \geq 0 \rightarrow \left[x - \frac{1}{x}\right] \geq -1 \rightarrow x - \frac{1}{x} \geq -1 \rightarrow x \geq \frac{1}{x} \rightarrow D_f = \left[\frac{1}{x}, +\infty\right) \end{aligned}$$

$$\begin{aligned} \text{b) } y &= \sqrt{x - \frac{1}{p}} + \sqrt{\frac{1}{p} - x} \rightarrow \left[x - \frac{1}{p} \right] + \left[-\left(x - \frac{1}{p} \right) \right] \geq 0 \text{ if } \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 = -1 \end{cases} \\ \rightarrow x - \frac{1}{p} \in \mathbb{Z} & \rightarrow D_f = \left\{ x \mid x = k + \frac{1}{p}, k \in \mathbb{Z} \right\} \end{aligned}$$

$a) y = \frac{\cot x + 1}{\tan x + 1} \rightarrow \begin{cases} \tan x \neq -1 \rightarrow x \neq \{k\pi - \frac{\pi}{4}\} \\ \cos x \neq 0 \rightarrow x \neq \{k\pi + \frac{\pi}{2}\} \\ \sin x \neq 0 \rightarrow x \neq \{k\pi\} \end{cases} \rightarrow D_f = \mathbb{R} - \left\{ \frac{k\pi}{2}, k\pi - \frac{\pi}{4} \right\}$ 	6
$b) y = \sqrt{1 - F \sin^2 x} \rightarrow 1 - F \sin^2 x \geq 0 \rightarrow F \sin^2 x \leq 1 \rightarrow \sin^2 x \leq \frac{1}{F} \rightarrow \frac{1}{\sqrt{F}} \leq \sin x \leq \frac{1}{\sqrt{F}}$ $\rightarrow \frac{1}{\sqrt{F}} \leq \sin x \leq \frac{1}{\sqrt{F}} \rightarrow D_f = \left[k\pi - \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right]$ 	7
$a) y = \sqrt{F \sin x - 1} \rightarrow F \sin x - 1 \geq 0 \rightarrow \sin x \geq \frac{1}{F} \rightarrow D_f = \left[k\pi + \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right]$ $\frac{\pi}{2} = \frac{\pi}{2} \rightarrow \frac{\pi}{2} = \frac{\pi}{2}$ 	8
$b) \sqrt{1 - F \cos x} \rightarrow 1 - F \cos x \geq 0 \rightarrow F \cos x \leq 1 \rightarrow \cos x \leq \frac{1}{F}$ $\rightarrow D_f = \left[k\pi + \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right]$ 	9
$a) y = \arcsin(x^2 + Fx + 1) \rightarrow -1 \leq x^2 + Fx + 1 \leq 1 \rightarrow \begin{cases} x^2 + Fx + 1 \geq -1 \rightarrow x^2 + Fx + 2 \geq 0 \rightarrow (x + F/2)^2 \geq 0 \text{ (I)} \\ x^2 + Fx + 1 \leq 1 \rightarrow x^2 + Fx \leq 0 \rightarrow x(x + F) \leq 0 \text{ (II)} \end{cases}$ $\rightarrow x \in \left[-\frac{F}{2}, \frac{F}{2} \right] \text{ (I)} \quad x \in \left[-F, 0 \right] \text{ (II)} \rightarrow D_f = \text{(I)} \cap \text{(II)} \rightarrow D_f = \left[-F, -\frac{F}{2} \right] \cup \left[\frac{F}{2}, 0 \right]$	10
$b) \cos y = \sqrt{\omega - Fx} \rightarrow \begin{cases} \omega - Fx \geq 0 \rightarrow Fx \leq \omega \rightarrow x \leq \frac{\omega}{F} \text{ (I)} \\ -1 \leq \sqrt{\omega - Fx} \leq 1 \rightarrow \omega - Fx \leq 1 \rightarrow Fx \geq \omega - 1 \rightarrow x \geq \frac{\omega - 1}{F} \text{ (II)} \end{cases}$ $\rightarrow D_f = \text{(I)} \cap \text{(II)} \rightarrow D_f = \left[\frac{\omega - 1}{F}, \frac{\omega}{F} \right] = \left[\frac{\omega - 1}{F}, \frac{\omega}{F} \right]$ $\rightarrow D_f = \left[\frac{\omega - 1}{F}, \frac{\omega}{F} \right] = \left[\frac{\omega - 1}{F}, \frac{\omega}{F} \right]$	11
$a) y = \log_{\frac{1}{F}}(1 - \log_{\frac{1}{F}} x) \rightarrow \begin{cases} x > 0 \text{ (I)} \\ 1 - \log_{\frac{1}{F}} x > 0 \rightarrow \log_{\frac{1}{F}} x < 1 \rightarrow x < F \text{ (II)} \end{cases} \rightarrow D_f = (0, F)$	12
$b) y = \log_{\frac{1}{F}}(1 - \log_{\frac{1}{F}} x) \rightarrow \begin{cases} x > 0 \text{ (I)} \\ 1 - \log_{\frac{1}{F}} x > 0 \rightarrow \log_{\frac{1}{F}} x < 1 \rightarrow -\log_{\frac{1}{F}} x < 1 \rightarrow \log_{\frac{1}{F}} x > -1 \rightarrow x > F^{-1} \rightarrow x > \frac{1}{F} \text{ (II)} \end{cases}$ $\rightarrow D_f = \text{(I)} \cap \text{(II)} \rightarrow D_f = \left(\frac{1}{F}, +\infty \right)$ $\rightarrow D_f = \left(\frac{1}{F}, +\infty \right)$	13
$a) y = \sqrt{F^2 x - x^F} - 1 \rightarrow F^2 x - x^F - 1 \geq 0 \rightarrow F^2 x - x^F \geq 1 \rightarrow F^2 x - x^F \geq 1 \rightarrow F^2 x - x^F - 1 \geq 0$ $\rightarrow x^F - F^2 x + 1 \leq 0 \xrightarrow{\text{Culler's method}} (x - F)(x - 1) \leq 0 \xrightarrow{\text{Culler's method}} x \in \left[\frac{1}{F}, F \right] \rightarrow D_f = \left[\frac{1}{F}, F \right]$	14
$b) y = \left(\frac{F^2 x + \omega}{F^2 x + F} \right)! \rightarrow \frac{F^2 x + \omega}{F^2 x + F} \in \mathbb{W} \rightarrow F^2 x + \omega \in F \mathbb{W} x + F \mathbb{W}$ $\rightarrow F^2 x - F \mathbb{W} x \in F \mathbb{W} - \omega \rightarrow x(F - F \mathbb{W}) \in F \mathbb{W} - \omega \rightarrow x \in \frac{F \mathbb{W} - \omega}{F - F \mathbb{W}}$ $\rightarrow D_f = \left\{ x \mid x = \frac{Fk - \omega}{F - Fk}, k \in \mathbb{W} \right\}$	15