

الف) $2x^3 + 3x^2 - 11x + 3 = 0$ $\Rightarrow (x-1)(2x^2 + 5x - 3) = 0 \Rightarrow (x-1)(2x-1)(x+3) = 0$
 جذبات: $x = 1, \frac{1}{2}, -3$
 $D = R - \{1, \frac{1}{2}, -3\}$

ب) $2x^3 + 9x^2 + 10x + 3 = (x+1)(x+3)(2x+1) = 0$
 $x = -1, -3, -\frac{1}{2}$
 $D = R - \{-1, -3, -\frac{1}{2}\}$

الف) $x^3 - 2x^2 + 2x - 1 = (x-1)(x^2 - x + 1) = 0$ $x = 1$
 $D = R - \{1\}$

ب) $\frac{x+3}{(x-1)(x^2-x+1)} \geq 0$ $x \neq 1$
 $\frac{x+3}{x-1} \geq 0 \Rightarrow x \leq -3 \text{ یا } x > 1$
 $D = (-\infty, -3] \cup (1, +\infty)$

آر $x \geq 1$ | آر $x < 1$
 $|x-1| = 1-x$ | $|x-1| = x-1$
 $x^2 - 0|x-1| - 2x + 0 = 0$ | $x^2 - 0(1-x) - 2x + 0 = 0$
 $x^2 - 2x = 0$ | $x^2 - 2x = 0$
 $x(x-2) = 0$ | $x(x-2) = 0$
 $x = 0, 2$ | $x = 0, 2$
 $D = R - \{0, 2\}$

الف) $\sqrt{[-x]-2} = y$ $[-x]-2 \geq 0 \Rightarrow [-x] \geq 2 \Rightarrow -x \geq 2 \Rightarrow x \leq -2$
 $D = (-\infty, -2]$

ب) $[x]^2 - 2[x] - 3 = ([x]-3)([x]+1)$
 $[x] \neq 3, -1$ $[x] = -1 \Rightarrow -1 \leq x < 0$ $[x] = 3 \Rightarrow 3 \leq x < 4$
 $D = (-\infty, -1) \cup [0, 3) \cup [4, +\infty)$

الف) $[x + \frac{1}{x}] = [x - \frac{1}{x} + 1] = [x - \frac{1}{x}] + 1 \geq 0$
 $[x - \frac{1}{x}] \geq -1 \Rightarrow x \geq \frac{1}{x}$
 $D = [\frac{1}{x}, +\infty)$

ب) $x - \frac{1}{x} = t$ $[t] + [-t]$
 $\Rightarrow x - \frac{1}{x} \in \mathbb{Z}$

$$\begin{aligned} \cos n \neq 0 \quad \tan n + 1 \neq 0 \\ \sin n \neq 0 \quad \tan n \neq -1 \end{aligned} \Rightarrow D = \mathbb{R} - \left\{ \left(\frac{k\pi}{2} \mid k \in \mathbb{Z} \right) \cup \left\{ -\frac{\pi}{2} + k\pi \mid k \in \mathbb{Z} \right\} \right\} \quad (\text{الف})$$

$$1 - r \sin^2 n \geq 0 \quad \sin^2 n \leq \frac{1}{r} \quad |\sin n| \leq \frac{1}{\sqrt{r}} \quad (ج)$$

$$D = \left\{ \left(\left[k\pi - \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right] \cup \left[k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2} \right] \mid k \in \mathbb{Z} \right) \right\}$$

$$\begin{aligned} r \sin n - 1 \geq 0 \\ \sin n \geq \frac{1}{r} \end{aligned} \quad D = \left\{ \frac{\pi}{2} + k\pi, \frac{3\pi}{2} + k\pi \mid k \in \mathbb{Z} \right\} \quad (\text{د})$$

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

$$1 - r \cos n \geq 0 \Rightarrow \cos n \leq \frac{1}{r} \quad D = \left\{ \frac{\pi}{r} + k\pi, \frac{2\pi}{r} + k\pi \mid k \in \mathbb{Z} \right\}$$

$$\begin{aligned} -1 \leq n^2 + r n + 1 \leq 1 \quad n^2 + r n + 1 \geq -1 \\ n^2 + r n + 1 \leq 1 \quad n^2 + r n + 1 \geq 0 \quad (n+1)(n+r) \geq 0 \\ n^2 + r n \leq 0 \quad n(n+r) \leq 0 \quad -r \leq n \leq 0 \quad n \leq -1 \quad n \geq -1 \end{aligned} \quad D = [-r, -1] \cup [-1, 0] \quad (\text{هـ})$$

$$\begin{aligned} -1 \leq \cos y \leq 1 \\ 0 \leq \sqrt{1 - r \cos y} \leq 1 \end{aligned} \quad 0 \leq 1 - r \cos y \leq 1 \quad n \leq \frac{2}{r} \quad n \geq 1 \quad D = \left[1, \frac{2}{r} \right] \quad (\text{و})$$

$$\begin{aligned} n > 0 \quad 1 - \log_r n > 0 \quad \log_r n < 1 \quad n < r \Rightarrow n < r \\ \text{استدلال} \end{aligned} \quad D = (0, r) \quad (\text{ز})$$

$$\begin{aligned} n > 0 \quad 1 - \log_{\frac{1}{r}} n > 0 \quad \log_{\frac{1}{r}} n < 1 \\ 0 < \frac{1}{r} < 1 \quad n > \left(\frac{1}{r} \right)^r \Rightarrow n > \frac{1}{r} \end{aligned} \quad D = \left(\frac{1}{r}, +\infty \right) \quad (\text{ح})$$

$$\begin{aligned} r^{n-n^2} - 1 \geq 0 \quad -n^2 + r n - r \geq 0 \quad D = [1, r] \\ r^{n-n^2} \geq 1 \quad r^{n-n^2} \geq r \quad -(n-1)(n-r) \geq 0 \end{aligned}$$

$$D = \left\{ \frac{r w - d}{r - r w} \mid w = 0, 1, 2, \dots \right\} \quad (\text{ط})$$

$$\begin{aligned} \frac{r n + d}{r n + r} \in W \quad w = 0, 1, 2, \dots \quad n = \frac{r w - d}{r - r w} \\ n(r - r w) = r w - d \\ r n + r \neq 0 \quad r n + d = w(r n + r) \Rightarrow r n + d = r w n + r w \end{aligned}$$