

الف) $x^2 - 6x = x(x-6)$ $x^2 - x = x(x^2-1) = x(x-1)(x+1)$ $x+1 \quad x \neq 0 \quad x \neq 1$ $-1 \quad 0 \quad 1 \quad 2$ $- \quad + \quad - \quad +$ $\rightarrow$ تعیین علامت $D_f = (-1, 0) \cup (0, 1) \cup (2, +\infty)$	ب) $x^2 - x^2 = x^2(x^2-1) = x^2(x-1)(x+1)$ $x^2 - x = x(x^2-1) = x(x-1)(x+1) \neq 0$ $\frac{x^2(x^2+1)(x+1)}{x(x-1)(x+1)} = x^2$ $y = \sqrt{x^2} = x$ $D_f = \mathbb{R} - \{-1, 0, 1\}$	1
الف) $x + x > 0 \rightarrow x < -x$ $\rightarrow x + x = x - x = 0$ $\rightarrow x < 0$ $x < 0 \rightarrow x + x = 2x \rightarrow 2x > 0 \rightarrow x > 0$ $D_f = (0, +\infty)$	ب) $x x > 0$ $x > 0 \rightarrow x = x \rightarrow x x = x^2 > 0 \rightarrow x > 0$ $x < 0 \rightarrow x = -x \rightarrow x x = (-x)x = -x^2 < 0 \times$ $D_f = (0, +\infty)$	2
الف) $2 - [x] > 0 \rightarrow [x] < 2 \rightarrow x < 3$ $D_f = (-\infty, 3)$	ب) $2 - [x] > 0 \rightarrow [x] < 2$ $D_f = (-\infty, 2)$	3
الف) $[x + \frac{1}{2}] = [x - \frac{1}{2}] + 1$ $y = \sqrt{2[x - \frac{1}{2}] + 1} \rightarrow 2[x - \frac{1}{2}] + 1 \geq 0$ $\rightarrow [x - \frac{1}{2}] \geq 0 \rightarrow x - \frac{1}{2} \geq 0$ $D_f = [\frac{1}{2}, +\infty)$	ب) $x - \frac{1}{2} = a \rightarrow [x + \frac{1}{2}] = [a]$ $\rightarrow [a] + [-a] = \begin{cases} 0 \rightarrow a \in \mathbb{Z} \checkmark \\ -1 \rightarrow a \notin \mathbb{Z} \times \end{cases}$ $x - \frac{1}{2} \in \mathbb{Z}$ $D_f = \{\frac{1}{2} + n n \in \mathbb{Z}\}$	4
الف) $\sin x - 1 \neq 0$ $\sin x \neq 1$ $D_f = \mathbb{R} - \{\frac{\pi}{2} + 2k\pi\}$	ب) $2\sin^2 x - 1 \neq 0$ $\sin^2 x \neq \frac{1}{2}$ $\sin x \neq \pm \frac{\sqrt{2}}{2}$ $D_f = \mathbb{R} - \{\frac{\pi}{4} + \frac{k\pi}{2}\}$	5

الف) $r \sin x - 1 \geq 0$ $\sin x \geq \frac{1}{r}$ $\downarrow$ $\frac{\pi}{r} \leq x \leq \frac{0\pi}{r}$ ⊕ ✓ $Df = [\frac{\pi}{r} + 2k\pi, \frac{0\pi}{r} + 2k\pi]$	ب) $\cos x - 1 \geq 0$ $\cos x \geq 1$ $Df = \{2k\pi\}$	٦
الف) $-1 \leq x-r \leq 1$ $r \leq x \leq r$ I, V, D $Df = [-r, -r] \cup [r, r]$ -r-1, -r, -r+1, r-1, r, r+1	ب) $-1 \leq x^r + rx + 1 \leq 1$ $\downarrow$ $x^r + rx + r \geq 0$ -1, -r $(x+1)(x+r) \geq 0$ $x^r + rx \leq 0$ -r, 0 $x(x+r) \leq 0$ -r, 0 $Df = [-r, -r] \cup [r, r]$	٧
الف) $x - r > 0 \rightarrow x > r$ $r - \log_r(x-r) > 0 \rightarrow \log_r(x-r) < r$ $x - r \leq r^r = 9$ $x \leq 11$ I, V, D ✓ $Df = \left(\frac{r}{e}, 11\right]$	ب) $x^r - x > 0$ $x(x-1)(x+1) > 0$ -1, 0, 1 $-1 < x < 0 \mid x > 1$ $Df = (-1, 0) \cup (1, +\infty)$	٨
الف) $e^x + 1 > 0 \rightarrow Df = \mathbb{R}$ ب) $e^x - 1 \neq 0 \rightarrow e^x \neq 1 \rightarrow x \neq 0 \rightarrow Df = \mathbb{R} - \{0\}$ ج) $e^x - r \neq 0 \rightarrow e^x \neq r \rightarrow x \neq \log_r r \rightarrow Df = \mathbb{R} - \{\log_r r\}$ د) $e^x - r \neq 0 \rightarrow e^x \neq r \rightarrow x \neq \log_r r \rightarrow Df = \mathbb{R} - \{\log_r r\}$		٩
الف) $e^x + 1 \in \mathbb{N} \rightarrow x \in \{0, 1, 2, \dots\}$ $\rightarrow x = \frac{k-1}{e}$ باستخدام قاعدة I, V, D ✓ $Df = \left\{ \frac{k-1}{e} \mid k = 0, 1, 2, \dots \right\}$	ب) $\frac{e^x - r}{e^x - 1} = n \rightarrow n \in \mathbb{N}$ طبق قاعدة كوشي $x \in \frac{e^x - r}{e^x - 1} \rightarrow x \in \frac{e^x - r}{e^x - 1}$ $Df = \left\{ \frac{e^x - r}{e^x - 1} \mid n \in \mathbb{N} \right\}$	١٠