

الف) $\frac{x^2 - 4x}{x^2 - x} \geq 0$ $x^2 - 4x \geq 0 \rightarrow x(x-4) \geq 0$ $x^2 - x \neq 0$ $x(x-1) \neq 0$ $P = (-1, 0) \cup (0, 1) \cup [4, +\infty)$	ب) $\frac{x^3 \cdot x^3}{x^3 - x} \geq 0$ $x^6 - x^3 \geq 0$ $x^3(x^3 - 1) \geq 0$ $x^3(x-1)(x^2+x+1) \geq 0$ $x^3(x-1) \geq 0$ $P = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$	۱
الف) $x + x > 0$ $x > 0 \rightarrow + \checkmark$ $x < 0 \rightarrow - \rightarrow 0 \times$ $x > -x$ $P = (0, +\infty) = \mathbb{R}^+$	ب) $x x > 0$ $x > 0 \rightarrow + \checkmark$ $x < 0 \rightarrow - \rightarrow - \times$ $P = (0, +\infty) = \mathbb{R}^+$	۲
الف) $2 - [x] \geq 0$ $[x] \leq 2$ $x < 3$ $P = (-\infty, 3)$	ب) $2 - [x] > 0$ $[x] < 2$ $x < 2$ $P = (-\infty, 2)$	۳
الف) $[x - \frac{1}{p}] + [x + \frac{2}{p}] \geq 0$ $[x - \frac{1}{p}] + 1 - 1 + [x + \frac{2}{p}] \geq 0$ $[x + \frac{2}{p}] - 1 + [x + \frac{2}{p}] \geq 0$ $[x + \frac{2}{p}] + [x + \frac{2}{p}] \geq 1 \rightarrow 2[x + \frac{2}{p}] \geq 1$ $P = [\frac{1}{p}, +\infty)$	ب) $[x - \frac{1}{p}] + [x + \frac{1}{p}] \geq 0$ $x \in \mathbb{Z} \quad [x] + [-x] = 0$ $x \notin \mathbb{Z} \quad [x] + [-x] = -1$ $x - \frac{1}{p} \in \mathbb{Z} \quad x \in \mathbb{Z} + \frac{1}{p}$ $P = \{x \mid x = a + \frac{1}{p}, a \in \mathbb{Z}\}$	۴
الف) $\sin x - 1 \neq 0$ $\sin x \neq 1$ $P = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$	ب) $\sin^2 x - 1 \neq 0$ $\sin^2 x \neq 1$ $P = \mathbb{R}$	۵

الف)

$$r \sin x - 1 \geq 0$$

$$\sin x \geq \frac{1}{r}$$



$$D_f = [r \arcsin \frac{1}{r} + \frac{\pi}{2}, r \arcsin \frac{1}{r} + \frac{3\pi}{2}]$$

ب) $\cos x - 1 \geq 0$

$$\cos x \geq 1$$



$$D_f = [r \arcsin 1, r \arcsin 1]$$

6

الف) $-1 \leq |x| \leq 1$

$$r \leq |x| \leq r$$

$$-r \leq x \leq -r$$

$$D_f = [-r, -r] \cup [r, r]$$

ب) $-1 \leq x^r + r_{n+1} \leq 1$

$$\frac{x^r + r_{n+1}}{1 + r_{n+1}} \rightarrow x^r + r_{n+1} \leq 1 \rightarrow x^r \leq 1 - r_{n+1}$$

$$-1 \leq x^r + r_{n+1} \rightarrow x^r \geq -1 - r_{n+1} \rightarrow (x+1)(x+r) \geq 0$$

$$\frac{x^r + r_{n+1}}{1 + r_{n+1}} \rightarrow x^r \leq 1 - r_{n+1} \rightarrow x^r \leq 1 - r_{n+1}$$

$$D_f = [-r, -r] \cup [r, r]$$

7

الف) $r - \log_r(x-r) \geq 0$

$$\log_r(x-r) \leq r$$

$$x-r \leq r^r = 9$$

$$x \leq 11$$

$$\log_r(x-r) \rightarrow x-r > 0 \rightarrow x > r$$

$$D_f = (r, 11]$$

$$\log(x^r - x) \rightarrow x^r - x > 0$$

$$\frac{x^r - x}{1 - r + r - r} \rightarrow x^r - x > 0$$

$$x(x^{r-1} - 1) > 0$$

$$D_f = (-1, 0) \cup (1, +\infty)$$

8

الف) $x^x + 1 \neq 0$

$$x^x \neq -1 \rightarrow D_f = \mathbb{R}$$

ب) $x^x - 1 \neq 0 \rightarrow x^x \neq 1$

$$x \neq 0 \rightarrow D_f = \mathbb{R} - \{0\}$$

ج) $x^x - r \neq 0 \rightarrow x^x \neq r \rightarrow x \neq \frac{1}{r}$

$$D_f = \mathbb{R} - \{\frac{1}{r}\}$$

د) $x^x - r \neq 0 \rightarrow x^x \neq r$

$$D_f = \mathbb{R} - \{\log_r r\}$$

9

$$r_{x+1} \in W \quad r_x \in W-1$$

$$x \in \frac{W-1}{r}$$

$$D_f = \{x \mid x = \frac{k-1}{r}, k \in W\}$$

$$\frac{r_{x-r}}{r_{x-d}} \in W \quad r_{x-r} \in r_{xW-dW}$$

$$r_{x-r}W \in r-dW$$

$$x \in \frac{r-dW}{r-rW}$$

$$D_f = \{x \mid x = \frac{r-dk}{r-rk}, k \in W\}$$

10