

الف) x^3 $\frac{x^3}{(x-1)(x^2+0x-3)} \neq 0$ $\begin{array}{r} x^3 \\ (x-1)(x^2+0x-3) \end{array}$ $\begin{array}{r} x^3 \\ x^2 - x - 3 \end{array}$ $\begin{array}{r} x^2 - x - 3 \\ x^2 - x - 3 \end{array}$ $\begin{array}{r} 0 \end{array}$ $D_f \subseteq R - \{-3, \frac{1}{3}\}$	ب) $\frac{x^3}{(x+1)(x^2+0x-3)} \neq 0$ $\begin{array}{r} x^3 \\ (x+1)(x^2+0x-3) \end{array}$ $\begin{array}{r} x^3 \\ x^2 + x - 3 \end{array}$ $\begin{array}{r} x^2 + x - 3 \\ x^2 + x - 3 \end{array}$ $\begin{array}{r} 0 \end{array}$ $D_f \subseteq R - \{-3, -\frac{1}{3}\}$
الف) x^3 $\frac{x^3}{(x+1)(x^2-x+1)} \neq 0$ $\begin{array}{r} x^3 \\ (x+1)(x^2-x+1) \end{array}$ $\begin{array}{r} x^3 \\ x^2 + x - x^2 + x + 1 \end{array}$ $\begin{array}{r} x^2 + x - x^2 + x + 1 \\ x^2 - x^2 + 2x + 1 \end{array}$ $\begin{array}{r} 2x + 1 \end{array}$ $D_f = (-\infty, -\frac{1}{2}) \cup (\frac{1}{2}, \infty)$	ب) $\frac{x^3}{(x+1)(x^2-x+1)} \neq 0$ $\begin{array}{r} x^3 \\ (x+1)(x^2-x+1) \end{array}$ $\begin{array}{r} x^3 \\ x^2 + x - x^2 + x + 1 \end{array}$ $\begin{array}{r} x^2 + x - x^2 + x + 1 \\ x^2 - x^2 + 2x + 1 \end{array}$ $\begin{array}{r} 2x + 1 \end{array}$ $D_f = (-\infty, -\frac{1}{2}) \cup (\frac{1}{2}, \infty)$
$x > 1 \rightarrow x^2 + 0x + 0 - 2x + 0 \neq 0$ $\begin{array}{r} x^2 + 0x + 0 - 2x + 0 \\ x^2 - 2x \end{array}$ $\begin{array}{r} x^2 - 2x \\ x^2 - 2x \end{array}$ $\begin{array}{r} 0 \end{array}$ $x < 1 \rightarrow x^2 + 0x + 0 - 2x + 0 \neq 0$ $\begin{array}{r} x^2 + 0x + 0 - 2x + 0 \\ x^2 - 2x \end{array}$ $\begin{array}{r} x^2 - 2x \\ x^2 - 2x \end{array}$ $\begin{array}{r} 0 \end{array}$ $D_f \subseteq R - \{-3, 2, 3\}$	$x > 1 \rightarrow x^2 + 0x + 0 - 2x + 0 \neq 0$ $\begin{array}{r} x^2 + 0x + 0 - 2x + 0 \\ x^2 - 2x \end{array}$ $\begin{array}{r} x^2 - 2x \\ x^2 - 2x \end{array}$ $\begin{array}{r} 0 \end{array}$ $x < 1 \rightarrow x^2 + 0x + 0 - 2x + 0 \neq 0$ $\begin{array}{r} x^2 + 0x + 0 - 2x + 0 \\ x^2 - 2x \end{array}$ $\begin{array}{r} x^2 - 2x \\ x^2 - 2x \end{array}$ $\begin{array}{r} 0 \end{array}$ $D_f \subseteq R - \{-3, 2, 3\}$
الف) $\{x\} - 2 \geq 0$ $\{x\} \geq 2$ $-x \geq 2$ $x \leq -2$ $D_f = (-\infty, -2]$	ب) $\frac{(t-3)(t+1)}{t^2 - 1} \geq 0$ $\begin{array}{r} (t-3)(t+1) \\ t^2 - 1 \end{array}$ $\begin{array}{r} (t-3)(t+1) \\ t^2 - 1 \end{array}$ $\begin{array}{r} (t-3)(t+1) \\ t^2 - 1 \end{array}$ $t \neq -1, 3 \rightarrow \{x\} x - 6 \geq 0$ $D_f \subseteq R - \{-6\} \cup [3, \infty)$
الف) $\{x - \frac{1}{3}\} + \{x - \frac{1}{3} + 1\}$ $\{x - \frac{1}{3}\} + 1 \geq 0$ $\{x - \frac{1}{3}\} \geq -1$ $\{x - \frac{1}{3}\} \geq -\frac{1}{3}$ $D_f = \{\frac{1}{3}, \infty\}$	ب) $a \in \{a\} + \{-a\} = 0$ $a \in \{a\} + \{-a\} = -1$ $x - \frac{1}{3} \in \mathbb{Z}$ $D_f = \{x x = k + \frac{1}{3}, k \in \mathbb{Z}\}$

$$\{ \exists x, \frac{x \wedge m}{p \wedge q} = x \mid x \} = \emptyset$$

1	$\frac{m \wedge \neg m}{p \wedge \neg p} \exists x$ $p \wedge \neg p \exists m \wedge \neg m$ $m \wedge \neg m \exists p \wedge \neg p$ $m \exists \frac{p \wedge \neg p}{p \wedge \neg p} \quad (1)$	$\frac{(m \wedge \neg m) \wedge (p \wedge \neg p)}{m \wedge \neg m \wedge p \wedge \neg p} \leftarrow \frac{(m \wedge \neg m) \wedge (p \wedge \neg p)}{m \wedge \neg m \wedge p \wedge \neg p}$ $\frac{p \wedge \neg p}{p \wedge \neg p} \leftarrow \frac{p \wedge \neg p}{p \wedge \neg p}$ $\{m\} = \emptyset \quad \frac{(m \wedge \neg m) \wedge (p \wedge \neg p)}{m \wedge \neg m \wedge p \wedge \neg p} \quad (1)$
2	$\{x\} = \emptyset \quad \frac{x}{x}$ $1 > \frac{x}{x} \wedge b \wedge 1$ $0 < \frac{x}{x} \wedge b \wedge 1$ $\frac{x}{x} \quad (1)$	$(m \wedge \neg m) \wedge (p \wedge \neg p) \leftarrow \frac{(m \wedge \neg m) \wedge (p \wedge \neg p)}{(m \wedge \neg m) \wedge (p \wedge \neg p)}$ $1 > \frac{x}{x} \wedge b \wedge 1$ $0 < \frac{x}{x} \wedge b \wedge 1$ $\frac{x}{x} \quad (1)$
3	$\frac{x \wedge \neg x}{x \wedge \neg x} \quad [0 \wedge \neg 0] = \emptyset$ $\frac{x \wedge \neg x}{x \wedge \neg x} \quad (1)$ $\frac{x \wedge \neg x}{x \wedge \neg x} \quad (1)$	$\{1 - x\} = \emptyset \leftarrow \frac{1 - x}{1 - x}$ $\frac{1 - x}{1 - x} \quad (1)$ $\frac{(1 - x) \wedge (1 + x)}{(1 - x) \wedge (1 + x)} \quad (1)$
4	$\left(\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \right) = \emptyset$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p}$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \quad (1)$	$\left[\frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2} \right] = \emptyset$ $\frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2}$ $\frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2} \wedge \frac{5}{2} \quad (1)$
5	$\left(\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \right) = \emptyset$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p}$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \quad (1)$	$\left\{ \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \right\} = \emptyset$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p}$ $\frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \wedge \frac{m \wedge \neg m}{p \wedge \neg p} \quad (1)$