

$$x^3 - 2x^2 + 21x - 10 \neq 0$$

$$(x-1)(x^2 - 14x + 10)$$

$$x \neq 1 \quad (x^2 - 14x + 10)$$

$$x \neq \frac{1 \pm \sqrt{19}}{2} = \frac{1 \pm \sqrt{19}}{2} (x-1)(x-4)$$

$$x \neq \frac{1 \pm \sqrt{19}}{2} = \frac{1 \pm \sqrt{19}}{2}$$

$$\frac{x^3 - 2x^2 + 21x - 10}{(x^3 - 2x^2 + 21x - 10)} \cdot \frac{x-1}{x-1}$$

$$\frac{(x^3 - 2x^2 + 21x - 10)(x-1)}{(x^3 - 2x^2 + 21x - 10)(x-1)}$$

$$\frac{-14x^2 + 21x - 10}{-14x^2 + 21x - 10}$$

$$\frac{10x - 10}{10x - 10}$$

$$\frac{10x - 10}{10x - 10}$$

$$D_f = R - \{1, \frac{1 \pm \sqrt{19}}{2}, \frac{1 \pm \sqrt{19}}{2}\}$$

$$x^3 - 2x^2 - 11x - 6 \neq 0$$

$$(x+1)(x^2 - 3x - 6)$$

$$x \neq -1 \quad (x^2 - 3x - 6)$$

$$x \neq \frac{3 \pm \sqrt{33}}{2} = \frac{3 \pm \sqrt{33}}{2} (x-4)(x+2)$$

$$x \neq \frac{3 \pm \sqrt{33}}{2}$$

$$\frac{x^3 - 2x^2 - 11x - 6}{(x^3 - 2x^2 - 11x - 6)} \cdot \frac{x+1}{x+1}$$

$$\frac{(x^3 - 2x^2 - 11x - 6)(x+1)}{(x^3 - 2x^2 - 11x - 6)(x+1)}$$

$$\frac{-3x^2 - 9x - 6}{-3x^2 - 9x - 6}$$

$$\frac{-3x - 3}{-3x - 3}$$

$$D_f = R - \{+2, -1, -\frac{2}{3}\}$$

$$x - \sqrt{3-2x} \neq 0$$

$$(-\sqrt{3-2x} \neq -x)$$

$$-x^2 - 3 - 2x \neq x^2$$

$$-(x^2 + 2x + 3) \neq 0$$

$$-(x+1)(x+3) \neq 0$$

$$x \neq -1, -3$$

$$3 - 2x \geq 0$$

$$\frac{3}{2} \geq x$$

$$x \leq \frac{3}{2}$$

$$D_f = (-\infty, \frac{3}{2}] - \{-1, -3\}$$

$$x = -1 \quad y = -\frac{1}{4}$$

$$x - \sqrt{3x-2} \neq 0$$

$$-x^2 + 3x - 2 \neq x^2$$

$$-(x^2 - 3x + 2) \neq 0$$

$$-(x-1)(x-2) \neq 0$$

$$x \neq 1, 2$$

$$3x - 2 \geq 0$$

$$\frac{2}{3} \leq x$$

$$x \geq \frac{2}{3}$$

$$D_f = [\frac{2}{3}, +\infty) - \{1, 2\}$$

$$\cos x - 1 \neq 0$$

$$\cos x \neq 1$$

$$\cos x \neq \frac{1}{2} \quad x \neq 0, \pi$$

$$D_f = R - \{2k\pi \pm \frac{\pi}{2}\}$$

$$\sin x + 1 \neq 0$$

$$\sin x \neq -1$$

$$x \neq \frac{3\pi}{2}, \frac{7\pi}{2}$$

$$D_f = R - \{2k\pi + \frac{3\pi}{2}, 2k\pi + \frac{7\pi}{2}\}$$

$$\cot x - 1 \neq 0$$

$$\cot x \neq 1$$

$$\frac{\cos x}{\sin x} \neq 1 \quad , \sin x \neq 0 \quad \left\{ \begin{array}{l} x \neq 0, \pi, 2\pi, \dots \\ \cos x \neq 1 \end{array} \right.$$

$$x \neq \frac{\pi}{4}, \frac{5\pi}{4}$$

$$D_f = R - \{k\pi, k\pi + \frac{\pi}{2}, 2k\pi + \frac{\pi}{2}, 2k\pi + \frac{5\pi}{2}\}$$

$$\sin^2 x - 3 \neq 0$$

$$\sin^2 x \neq 3$$

$$\sin^2 x \neq \frac{3}{2}$$

$$\sin x \neq \pm \frac{\sqrt{3}}{2} \Rightarrow x \neq \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$D_f = R - \{k\pi \pm \frac{\pi}{3}\}$$

③ الف) $x^2 - 5x + 4 > 0$
 $(x-4)(x-1) > 0$ $\begin{array}{c} 2 \quad 4 \\ + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = (-\infty, 1) \cup (4, +\infty)$

ب) $x^2 - 4x + 4 < 0$
 $(x-1)(x-5) < 0$ $\begin{array}{c} 1 \quad 5 \\ + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = (1, 5)$

ج) $x^2 + 4x + 5 \geq 0$
 $(x+1)(x+5) \geq 0$ $\begin{array}{c} -5 \quad -1 \\ + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = (-\infty, -5] \cup [-1, +\infty)$

د) $x^2 - 4x + 4 \leq 0$
 $(x-1)(x-4) \leq 0$ $\begin{array}{c} 1 \quad 4 \\ + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = [1, 4]$

④ الف) $\frac{x^2 - 3x + 2}{x-5} < 0$ $(x \neq 5)$

$\frac{(x-1)(x-2)}{x-5} < 0$ $\begin{array}{c} 1 \quad 2 \quad 5 \\ - \quad | \quad + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \quad 0 \end{array}$ $D_f = (-\infty, 1) \cup (2, 5)$

ب) $\frac{x^2 - 1}{x^2 - 4x + 5} \geq 0$ $\frac{(x-1)(x+1)}{(x-1)(x-5)} \geq 0$ $\begin{array}{c} -1 \quad 1^* \quad 5 \\ + \quad | \quad - \quad | \quad - \quad | \quad + \\ 0 \quad 0 \quad 0 \end{array}$ $D_f = (-\infty, -1] \cup (5, +\infty)$

④ الف) $\frac{x^2 - 4x + 3}{x^2 - 1} \geq 0$ $\frac{(x-1)(x-3)}{(x-1)(x+1)} \geq 0$ $\begin{array}{c} 1^* \quad 3 \\ - \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = [3, +\infty)$
 $x^2 - 1 \neq 0$
 $x^2 \neq 1$
 $(x \neq 1)$
 $\Delta = b^2 - 4ac$
 $= 16 - 12 = 4$
 $\sqrt{\Delta} = 2$
 $x = \frac{4 \pm 2}{2} = 1, 3$

ب) $x^2 - 1 \neq 0$
 $x^2 \neq 1$
 $x \neq \pm 1$
 $D_f = \mathbb{R} - \{-1, 1\}$

⑤ الف) $x^2 - 3x > 0$
 $x(x-3) > 0$ $\begin{array}{c} 0 \quad 3 \\ + \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$ $D_f = (-\infty, 0) \cup (3, +\infty)$

ب) $14 - x^2 > 0$ $x^2 < 14$ $x < \sqrt{14}$
 $x > -\sqrt{14}$

$|x| - 2 > 0$ $|x| > 2$ $2 < x$
 $x < -2$

$|x| - 2 \neq 0$

$|x| \neq 2$

$|x| \neq -2$

$(x \neq \pm 2)$

$D_f = (-\sqrt{14}, -2) \cup (2, \sqrt{14}) - \{-2, 2\}$

ج) $1 - x > 0$ $(x < 1)$ $\frac{(x-3)(x-5)}{x-2} > 0$ $D_f = (2, 1) - \{9\}$

$1 - x \neq 0$

$(x \neq 1)$

$(x > 2)$

$\begin{array}{c} 2 \quad 5 \\ - \quad | \quad - \quad | \quad + \\ 0 \quad 0 \end{array}$

۱) $x^2 - 11x + 21 \geq 0$
 $(x-7)(x-3) \geq 0$
 $\begin{array}{c} + \quad - \quad - \quad + \\ \hline \end{array} \rightarrow (-\infty, 3] \cup [7, +\infty)$

$x \neq 1$
 $x > 0$

$\sqrt{34 - x^2} > 0$
 $34 - x^2 > 0$
 $x^2 < 34$
 $-4 < x < 4$

$D_f = (0, 4] - \{1\}$

۸) $\frac{x^2 - x}{x^2 + x} \rightarrow \frac{x(x-1)}{x(x+1)}$
 $\begin{array}{c} - \quad + \quad - \quad + \\ \hline \end{array}$

	-1	0	1	
$x^2 - x$	+	+	-	+
$x^2 + x$	+	-	+	+
	+	-	-	+

۹) $y = \sqrt{\frac{x - f(x)}{f(x)}}$
 $\frac{x - f(x)}{f(x)} \geq 0$

$x - f(x) = 0$
 $x = f(x) \rightarrow -1, 2$

$f(x) \neq 0 \rightarrow -2, 2 \neq x$

$\begin{array}{c} - \quad + \quad - \quad + \\ \hline \end{array}$

$D_f = (-2, -1] \cup (2, 2]$

