

الف) $R = \{x \mid x^3 - 19x^2 + 131x - 15\}$ → $\frac{x^3 - 19x^2 + 131x - 15}{x^2 - 17x + 15} = 0$ $\Rightarrow x^3 - 19x^2 + 131x - 15 = (x-1)(x^2 - 18x + 15) = 0$ $\Rightarrow D_f = \mathbb{R} - \{1, \frac{9}{2}, \frac{5}{2}\}$	ب) $\frac{x^3 - 19x^2 + 131x - 15}{x^2 - 17x + 15} = 0$ $\Rightarrow x^3 - 19x^2 + 131x - 15 = (x+1)(x^2 - 20x + 15) = 0$ $\Rightarrow D_f = \mathbb{R} - \{-1, 10, \frac{3}{2}\}$
الف) $\sqrt{3-2x} \geq 0 \Rightarrow x \leq \frac{3}{2}$ $\frac{3-2x}{x^2 - 3x + 2} \neq 0 \Rightarrow 3-2x \neq 0 \Rightarrow x \neq \frac{3}{2}$ $\Rightarrow D_f = (-\infty, \frac{3}{2}) \cup \{1\}$	ب) $\sqrt{3-2x} \geq 0 \Rightarrow x \leq \frac{3}{2}$ $\frac{3-2x}{x^2 - 3x + 2} \neq 0 \Rightarrow 3-2x \neq 0 \Rightarrow x \neq \frac{3}{2}$ $\Rightarrow D_f = [\frac{3}{2}, +\infty) \cup \{1\}$
الف) $\sqrt{\cos x - 1} \neq 0 \Rightarrow \cos x \neq 1 \Rightarrow \cos x \neq \frac{1}{1} \Rightarrow x \neq 2k\pi$ $\Rightarrow D_f = \mathbb{R} - \{2k\pi, \frac{\pi}{2}, \frac{3\pi}{2}\}$	ب) $\sqrt{\sin x + 1} \neq 0 \Rightarrow \sin x \neq -1 \Rightarrow \sin x \neq \frac{-1}{1} \Rightarrow x \neq \frac{3\pi}{2}$ $\Rightarrow D_f = \mathbb{R} - \{2k\pi - \frac{\pi}{2}, 2k\pi - \frac{5\pi}{2}\}$
ج) $\tan x = \frac{\sin x}{\cos x} \Rightarrow \cos x \neq 0 \Rightarrow \cot x = \frac{\cos x}{\sin x} \Rightarrow \sin x \neq 0$ $\Rightarrow D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{2}\}$	د) $\sin^2 x - 3 \neq 0 \Rightarrow \sin^2 x \neq \frac{3}{1} \Rightarrow \sin x \neq \pm \frac{\sqrt{3}}{1}$ $\Rightarrow D_f = \mathbb{R} - \{k\pi + \frac{\pi}{3}, k\pi - \frac{\pi}{3}\}$
الف) $(x-3)(x-2) > 0$ $\Rightarrow x \in (-\infty, 2) \cup (3, +\infty)$	ب) $(x-1)(x-5) < 0$ $\Rightarrow x \in (1, 5)$

الف) $y = \sqrt{\frac{(x-1)(x-3)}{(x-1)(x+1)}}$

$\frac{(x-1)(x-3)}{(x-1)(x+1)} \geq 0$

$\frac{x-3}{x+1} \geq 0$

$x-3 \geq 0 \Rightarrow x \geq 3$

$x-3 \leq 0 \Rightarrow x \leq 3$

$x+1 > 0 \Rightarrow x > -1$

$x+1 < 0 \Rightarrow x < -1$

$x \neq -1$

$\Rightarrow D_f = [3, +\infty)$

ب) $\sqrt{\frac{(x-1)(x-3)}{(x-1)(x+1)}}$

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$x+1 < 0 \Rightarrow x < -1$

$x \neq -1$

$\Rightarrow D_f = \mathbb{R} - \{-1, -3\}$

الف) $\log_b a \rightarrow a > 0$
 $b > 0$
 $b \neq 1$

$a^x - 3a > 0$

$a(a-3) > 0$

$a > 3$

$a < 3$

$a \neq 0$

$\Rightarrow D_f = (-\infty, 0) \cup (3, +\infty)$

ب) $\begin{cases} 14 - x^2 > 0 \rightarrow x^2 < 14 \rightarrow -\sqrt{14} < x < \sqrt{14} \\ |x-2| > 0 \rightarrow |x| > 2 \rightarrow \begin{cases} x > 2 \\ x < -2 \end{cases} \\ |x-2| \neq 1 \rightarrow x \neq 3 \rightarrow x \neq \pm 3 \end{cases}$

$\Rightarrow D_f = (-\sqrt{14}, -2) \cup (-2, 2) \cup (2, \sqrt{14}) - \{3, -3\}$

ج) $\begin{cases} \frac{(x-3)(x-4)}{x-3} > 0 \rightarrow x-4 > 0 \rightarrow x > 4 \\ 10-x > 0 \rightarrow x < 10 \\ 10-x \neq 0 \rightarrow x \neq 10 \end{cases}$

$\Rightarrow D_f = (4, 10) - \{10\}$

د) $\begin{cases} (x-4)(x-7) \geq 0 \rightarrow x \leq 4 \text{ or } x \geq 7 \\ 14 - x^2 > 0 \rightarrow x^2 < 14 \rightarrow -\sqrt{14} < x < \sqrt{14} \\ x > 0 \\ x \neq 1 \end{cases}$

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

$y = \frac{x^2 - x}{x^2 + x} \rightarrow \frac{x^2 + x = 0 \rightarrow x(x+1) = 0 \rightarrow \begin{cases} x = 0 \\ x = -1 \end{cases}$

$\frac{x^2 - x = 0 \rightarrow x(x-1) = 0 \rightarrow \begin{cases} x = 0 \\ x = 1 \end{cases}$

$x \neq 0$

$\Rightarrow D_f = (-1, 0) \cup (0, 1)$

الف) $\frac{x^2 - x}{x^2 + x}$

x	-1	0	1
$x^2 - x$	+	+	-
$x^2 + x$	+	-	+
$f(x)$	+	-	+

$x - f(x) = 0 \rightarrow x = f(x) \rightarrow$ تقاطع تابع و $y=x$

$f(x) = 0 \rightarrow \begin{cases} x = 2 \\ x = -2 \end{cases} \Rightarrow P_{(x)} = \frac{x - f(x)}{f(x)}$

$P_{(x)} \geq 0$

$\Rightarrow D_f = [-2, -1] \cup (2, 3]$

الف) $f(x) + 1$

ج) $-f(x)$

ب) $f(x-1)$

د) $f(x+1) + 1$