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الف) $y = \frac{x+2}{x^3-20x^2+2/x-1}$ $\rightarrow x^3-20x^2+2/x-1 \neq 0 \Rightarrow x \neq 1 \rightarrow D_f = \mathbb{R} - \{1\}$
 $D_f = \mathbb{R} - \{1, \frac{2}{5}, \frac{5}{2}\}$

ب) $y = \frac{x+3}{x^3-x^2-1x-4}$ $\rightarrow y \rightarrow x^3-x^2-1x-4 \neq 0 \Rightarrow x \neq -1 \rightarrow D_f = \mathbb{R} - \{-1\}$
 $D_f = \mathbb{R} - \{-1, -\frac{2}{3}, 2\}$

الف) $y = \frac{x+1}{x-\sqrt{3-2x}}$ $\rightarrow 3-2x \geq 0 \Rightarrow 2x \leq 3 \Rightarrow x \leq 1.5$ $x-\sqrt{3-2x} \neq 0$
 $\Rightarrow x \neq \sqrt{3-2x} \Rightarrow x^2 \neq 3-2x \Rightarrow x^2+2x-3 \neq 0 \Rightarrow x \neq -3, 1 \rightarrow D_f = (-\infty, 1.5] - \{-3, 1\}$

ب) $y = \frac{x+2}{x-\sqrt{3x-2}}$ $\rightarrow 3x-2 \geq 0 \Rightarrow 3x \geq 2 \Rightarrow x \geq \frac{2}{3}$ $x-\sqrt{3x-2} \neq 0$
 $\Rightarrow x \neq \sqrt{3x-2} \Rightarrow x^2 \neq 3x-2 \Rightarrow x^2-3x+2 \neq 0 \Rightarrow x \neq 1, 2 \rightarrow D_f = [\frac{2}{3}, +\infty) - \{1, 2\}$

الف) $y = \frac{\sin x}{2\cos x-1}$ $\rightarrow 2\cos x-1 \neq 0 \Rightarrow 2\cos x \neq 1 \Rightarrow \cos x \neq \frac{1}{2} \Rightarrow x \neq \frac{\pi}{3}, \frac{5\pi}{3}$
 $\rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{3}, 2k\pi - \frac{\pi}{3}\}$

ب) $y = \frac{\cos x+1}{2\sin x+1}$ $\rightarrow 2\sin x+1 \neq 0 \Rightarrow \sin x \neq -\frac{1}{2} \Rightarrow x \neq \frac{4\pi}{3}, \frac{5\pi}{3} \rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{4\pi}{3}, 2k\pi + \frac{5\pi}{3}\}$
 ج) $y = \frac{\tan x+2}{\cot x-1}$ $\rightarrow \cot x-1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow x \neq \frac{\pi}{4}, \frac{5\pi}{4} \rightarrow D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}\}$

الف) $x^2-5x+6 > 0 \Rightarrow$ ریشه ها $= 2, 3 \rightarrow \frac{1}{x-2} > 0 \rightarrow (-\infty, 2) \cup (3, +\infty)$

ب) $x^2-6x+9 < 0 \Rightarrow$ ریشه ها $= 3, 3 \rightarrow \frac{1}{x-3} < 0 \rightarrow (3, +\infty)$

ج) $x^2+6x+9 \geq 0 \Rightarrow$ ریشه ها $= -3, -3 \rightarrow \frac{1}{x+3} \geq 0 \rightarrow (-\infty, -3] \cup [-3, +\infty)$

الف) $\frac{x^2-3x+2}{x^2-6x+9} \leq 0 \rightarrow \frac{1}{x-3} \leq 0 \rightarrow (-\infty, 3) \cup (3, +\infty)$
 ب) $\frac{x^2-1}{x^2-6x+9} \geq 0 \rightarrow \frac{1}{x-3} \geq 0 \rightarrow (3, +\infty) \cup (-\infty, -1]$

۳) $y = \frac{\sin x+1}{2\sin x-3}$ $\rightarrow 2\sin x-3 \neq 0 \Rightarrow 2\sin x \neq 3 \Rightarrow \sin x \neq \frac{3}{2} \Rightarrow \sin x \neq \frac{\sqrt{3}}{2} \Rightarrow x \neq \frac{\pi}{3}, \frac{2\pi}{3}$
 $\rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{3}, 2k\pi + \frac{2\pi}{3}\}$ $D_f = \mathbb{R} - \{k\pi \pm \frac{\pi}{3}\}$

a) $y = \sqrt{\frac{x^2 - 3x + 3}{x^2 - 1}} \rightarrow \frac{x^2 - 3x + 3}{x^2 - 1} \geq 0 \rightarrow \dots \rightarrow D_f = (-\infty, 1) \cup (3, +\infty)$ ✓

b) $y = \sqrt{\frac{x^2 - 3x + 3}{x^2 - 1}} \rightarrow \dots \rightarrow \mathbb{R} - \{1, -1\}$ ✓ (5)

a) $y = \log(x^2 - 3x) \rightarrow x^2 - 3x > 0 \Rightarrow x(x - 3) > 0 \rightarrow \dots \rightarrow D_f = (-\infty, 0) \cup (3, +\infty)$ ✓

b) $y = \log \frac{19 - x^2}{|x| - 2} \rightarrow |2 - x^2| > 0 \rightarrow \dots \Rightarrow D_f = (-2, -1) \cup (1, 2) - \{1, -1\}$ ✓ (170)

c) $y = \log \frac{x^2 - 3x + 3}{x - 1} \rightarrow \dots \Rightarrow D_f = (1, 3) \cup (3, +\infty) - \{3\}$ ✓

d) $y = \sqrt{x^2 - 11x + 18} + \log \frac{x^2 - 3x}{x} \rightarrow \dots \Rightarrow D_f = [1, 6] - \{1\}$ ✓

$y = \frac{x^2 - x}{x^2 + x}$

Sign chart for $x^2 - x$ and $x^2 + x$ with critical points at -1, 0, 1. ✓ (5)

Sign chart for $P(x)$ with critical points at -1, 0, 1. ✓

$y = \sqrt{\frac{x - f(x)}{f(x)}} \rightarrow f(x) \neq 0 \Rightarrow \frac{x - f(x)}{f(x)} \geq 0 \Rightarrow \dots \rightarrow D_f = (-2, -1] \cup (2, 3]$ ✓ (5)

