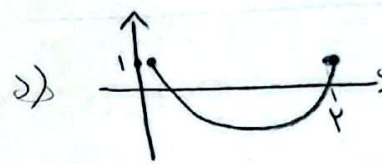
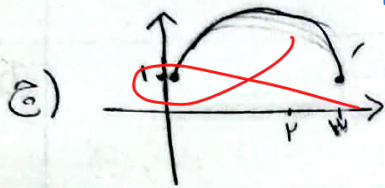


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(الف) $x^2 - 5x + 6 > 0 \rightarrow (x-2)(x-3) > 0$

Sign chart: $+$ $-$ $+$ at 2 and 3 .

Solution: $(-\infty, 2) \cup (3, +\infty)$

(ب) $x^2 - 4x + 5 < 0 \rightarrow \frac{c}{a} = 5$

Sign chart: $+$ $-$ $+$ at 1 and 5 .

Solution: $(1, 5)$

(ج) $x^2 + 4x + 5 > 0 \rightarrow \frac{-4 \pm \sqrt{16-20}}{2} = \frac{-4 \pm 2i}{2} = -2 \pm i$

Sign chart: $+$ $-$ $+$ at -5 and -1 .

Solution: $(-\infty, -5) \cup (-1, +\infty)$

(د) $x^2 - 7x + 4 < 0 \rightarrow \frac{c}{a} = 4$

Sign chart: $+$ $-$ $+$ at 1 and 4 .

Solution: $(1, 4)$

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

Sign chart: $-$ $+$ $-$ $+$ at 1 , 2 , and 5 .

Solution: $(-\infty, 1) \cup (2, 5)$

(ب) $\frac{x^2 - 1}{x^2 - 4x + 5} \geq 0$

Sign chart: $+$ $-$ $-$ $-$ $+$ at -1 , 1 , 4 , and 5 .

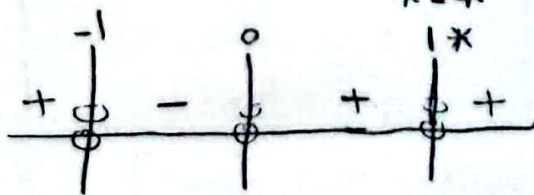
Solution: $(-\infty, -1] \cup (5, +\infty)$

(الف) $y = \sqrt{\frac{x^3 - 1}{x^3 - 2}}$

Domain conditions: $x^3 - 1 \geq 0$ and $x^3 - 2 > 0$

Sign chart: $+$ $-$ $+$ $+$ at -1 , 0 , 1 , and 2 .

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



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

$\psi) y = \sqrt{x^2 - 14}$ $\rightarrow \frac{x^2 - 14}{x^2 - 2x + 2} \geq 0 \quad \frac{(x-4)(x+1)}{(x-1)(x-1)} \geq 0$

$D_f = (-\infty, -1) \cup (1, 4) \cup (4, +\infty)$

الف) $y = \sqrt{x - \sqrt{2 - x}}$

$D_f = [-1, 2]$

① $2 - x \geq 0 \quad x \leq 2$
 ② $x - \sqrt{2 - x} \geq 0 \quad \sqrt{2 - x} \leq x \quad \begin{matrix} 2 - x \leq 14 \\ -x \leq 14 \rightarrow x \geq -14 \end{matrix}$
 $-1 \leq x \leq 2$

ب) $y = \sqrt{x - \sqrt{x - 2}}$

$D_f = [2, 11]$

① $x - 2 \geq 0 \quad x \geq 2$
 ② $x - \sqrt{x - 2} \geq 0 \quad \sqrt{x - 2} \leq x \quad \begin{matrix} x - 2 \leq 9 \\ x \leq 11 \end{matrix}$
 $2 \leq x \leq 11$

الف) $y = \sqrt{x - 2x^2}$

$D_f = [-1, 1]$

$x - 2x^2 \geq 0 \quad 2x^2 \leq x \quad \begin{matrix} x^2 \leq \frac{1}{2} \\ -\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}} \end{matrix}$

ب) $y = \sqrt{3|x| - 9}$

$D_f = [-3, 3]$

$3|x| - 9 \geq 0 \quad 3|x| \geq 9 \quad |x| \geq 3 \quad \begin{matrix} x \geq 3 \\ x \leq -3 \end{matrix}$

الف) $y = \frac{\sqrt[3]{|x| + 1}}{|x| - 3}$

$D_f = \mathbb{R} - \{\pm 3\}$

$|x| - 3 \neq 0 \quad |x| \neq 3 \quad x \neq \pm 3$

ب) $y = \frac{\sqrt[3]{\sqrt{x} + 1}}{\sqrt{x} - 3}$

$D_f = [0, +\infty) - \{9\}$

$x \geq 0 \quad \sqrt{x} - 3 \neq 0 \quad \sqrt{x} \neq 3 \quad x \neq 9$

الف) $y = \frac{\sin x}{x \cos x - 1}$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$

$x \cos x - 1 \neq 0 \quad x \cos x \neq 1 \quad \cos x \neq \frac{1}{x}$

ب) $y = \frac{\cos x + 1}{x \sin x + 1}$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$

$x \sin x + 1 \neq 0 \quad \sin x \neq -\frac{1}{x}$

ج) $y = \frac{\tan x + 1}{\cot x - 1}$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{4}, \frac{5\pi}{4} \right\}$

$\tan x = \frac{\sin}{\cos} \rightarrow \cos \neq 0 \quad \cot x = \frac{\cos}{\sin} \rightarrow \sin \neq 0$

د) $y = \frac{\sin x + 1}{x \sin^2 x - 3}$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{4}, \frac{5\pi}{4} \right\}$

$x \sin^2 x - 3 \neq 0 \quad \sin^2 x \neq \frac{3}{x}$

$$y = \frac{1}{\sqrt{\gamma|x-\gamma| - \frac{1}{\gamma}}}$$

$$\gamma|x-\gamma| - \frac{1}{\gamma} > 0$$

$$\gamma|x-\gamma| > \frac{1}{\gamma} \rightarrow |x-\gamma| > \frac{1}{\gamma}$$

$$x-\gamma > \frac{1}{\gamma}$$

$$x-\gamma < -\frac{1}{\gamma}$$

$$D_f = (-\infty, \frac{\gamma}{\gamma}) \cup (\frac{\gamma}{\gamma} + \infty, \infty) \setminus \frac{\gamma}{\gamma}, x < \frac{\gamma}{\gamma}$$

(P) ✓

$$g = \sqrt{\gamma - \gamma|x|}$$

$$\gamma - \gamma|x| \geq 0$$

$$\gamma|x| \leq \gamma$$

$$|x| \leq 1$$

$$x \leq 1$$

$$x \geq -1$$

$$-1 \leq x \leq 1$$

$$D_f = [-1, 1]$$

$$g) y = \sqrt{\frac{|x|}{|x|}} \rightarrow +\infty$$

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