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Subject :

الميكانيكا الكلاسيكية

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Date :

$$1) \quad y = \frac{\sin x - 2}{2 \cos x + 1} \quad 2 \cos x + 1 \neq 0 \quad \cos x \neq -\frac{1}{2} \quad (1)$$

$$D_f = \mathbb{R} - \left\{ 2k\pi + \frac{4}{3}\pi, 2k\pi + \frac{2}{3}\pi \right\} \quad \checkmark$$

$$2) \quad y = \frac{\sin x + 2}{\cos x - 1} \quad \cos x \neq 1 \quad (2)$$

$$D_f = \mathbb{R} - \{2k\pi\} \quad \checkmark$$

$$3) \quad y = \frac{2 \sin x + 1}{\tan x + 1} \rightarrow \frac{2 \sin x + 1}{\frac{\sin x}{\cos x} + 1} \quad \cos x \neq 0 \quad (3)$$

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

$$D_f = \mathbb{R} - \left\{ k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right\} \quad \checkmark$$

$$4) \quad y = \frac{\cos x + 1}{\cot x - 1} \rightarrow \frac{\cos x + 1}{\frac{\cos x - 1}{\sin x}} \quad \sin x \neq 0 \quad (4)$$

$$\frac{\cos x - 1}{\sin x} \neq 1$$

$$D_f = \mathbb{R} - \{k\pi, k\pi + \pi\} \quad \checkmark$$

$$5) \quad \sin y = x - 2 \quad -1 \leq x - 2 \leq 1 \rightarrow -1 \leq x \leq 3 \quad (5)$$

$$\rightarrow \begin{cases} \sqrt{3} \leq x \leq 3 \\ x > 1, x < -1 \end{cases}$$

$$D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}] \quad \checkmark$$



$$\rightarrow y = \arccos(\sqrt{x}-2) \quad -1 \leq \sqrt{x}-2 \leq 1 \rightarrow 1 \leq \sqrt{x} \leq 3$$

(2)

$$\rightarrow 1 \leq x \leq 9$$

$$D_f = [1, 9] \checkmark$$

$$\text{الف) } \cos y = |x|-2 \quad -1 \leq |x|-2 \leq 1 \rightarrow 1 \leq |x| \leq 3 \quad (4)$$

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

$$x \geq 2 \quad x \leq -2$$

$$D_f = [-3, -2] \cup [2, 3] \checkmark$$

(2)

$$\rightarrow y = \arcsin(x^2+3x+1) \quad -1 \leq x^2+3x+1 \leq 1$$

(I)

II

$$\frac{-1}{+} \frac{0}{-} \frac{+}{+}$$

$$\frac{-1}{+} \frac{-1}{-} \frac{+}{+}$$

$$x^2+3x \leq 0 \rightarrow x(x+3) \quad \text{I}$$

$$x^2+3x+2 \geq 0 \rightarrow (x+1)(x+2) \quad \text{II}$$

$$D_f = [-3, 0] \cap ((-\infty, -2] \cup [-1, \infty)) = [-3, -2] \cup [-1, 0] \checkmark$$

$$\text{الف) } y = \log_2(x^2-4) \quad x^2-4 > 0 \rightarrow x^2 > 4 \rightarrow x > 2, x < -2 \quad (5)$$

$$D_f = (-\infty, -2) \cup (2, +\infty) \checkmark$$

$$\rightarrow y = \log_2|x-2| \quad |x-2| > 0 \rightarrow |x| < 2 \rightarrow -2 < x < 2$$

$$D_f = (-2, 2) \checkmark$$

(2)

1. (الف) $y = \log_{x-3} \omega - x$ $\omega - x > 0 \rightarrow x < \omega$ (2)
 $x - 3 > 0 \rightarrow x > 3, x - 3 \neq 1 \rightarrow x \neq 4$

3. $D_f = (3, \omega) - \{4\}$ ✓ (2)

5. (ب) $y = \log_{x+3} x^2 - 1$ $x^2 - 1 > 0 \rightarrow x^2 > 1 \rightarrow x > 1, x < -1$
 $x + 3 > 0 \rightarrow x > -3, x + 3 \neq 1 \rightarrow x \neq -2$

7. $D_f = (-3, -1) \cup (1, +\infty) - \{-2\}$ ✓

9. (الف) $y = \log_{x-3} \frac{x^2 - 5x + 3}{x-3}$ $x - 3 \neq 0 \rightarrow x \neq 3$ (2)
 $\frac{x^2 - 5x + 3}{x-3} > 0$ $\frac{x^2 - 5x + 3}{x-3} > 0$ $\frac{x^2 - 5x + 3}{x-3} > 0$

11. $D_f = (1, +\infty) - \{3\}$ ✓

13. (ب) $y = \log_{x+5} \frac{x+3}{x+5}$ $x + 5 \neq 0 \rightarrow x \neq -5, x + 5 > 1 \rightarrow x > -4$
 $\frac{x+3}{x-2} > 0$ $\frac{x+3}{x-2} > 0$ $\frac{x+3}{x-2} > 0$

15. $D_f = (-5, -3) \cup (2, +\infty) - \{-4\}$ ✓

17. (الف) $y = \sqrt{2 - \log_r(x-2)}$ $x - 2 > 0 \rightarrow x > 2$ (1)
 $2 - \log_r(x-2) \geq 0 \rightarrow \log_r(x-2) \leq 2$

19. $D_f = (2, 16]$ ✓ $\rightarrow x - 2 \leq 16 \rightarrow x \leq 18$

$$\rightarrow y = \log(r \log_r x - 1) \quad x > 0 \text{ I } r \log_r x - 1 > 0 \rightarrow \log_r x > \frac{1}{r} \\ \rightarrow x > r^{\frac{1}{r}} \text{ II}$$

$$D_f = \text{I} \cap \text{II} = (r^{\frac{1}{r}}, +\infty) \checkmark$$

$$\text{الف) } y = \frac{r}{r^x + 1} \quad r^x + 1 \neq 0 \rightarrow r^x \neq -1 \checkmark \text{ (9)}$$

$$D_f = \mathbb{R} \checkmark \quad \text{(2)}$$

$$\rightarrow y = \frac{r}{r^x - 1} \quad r^x - 1 \neq 0 \rightarrow r^x \neq 1 \rightarrow x \neq 0$$

$$D_f = \mathbb{R} - \{0\} \checkmark$$

$$\text{ج) } y = \frac{r}{r^x - r} \quad r^x - r \neq 0 \rightarrow r^x \neq r \rightarrow x \neq \log_r r = \frac{1}{r}$$

$$D_f = \mathbb{R} - \{\log_r r\} \checkmark$$

$$\rightarrow y = \frac{r}{r^x - r^r} \quad r^x - r^r \neq 0 \rightarrow r^x \neq r^r \rightarrow x \neq \log_r r^r$$

$$D_f = \mathbb{R} - \{\log_r r^r\} \checkmark$$

1 $\text{الف) } y = (x+1)! \quad x+1 \in \mathbb{N} \rightarrow x \in \frac{\mathbb{N}-1}{f}$ (10)

2

3 $D_f = \{x \mid x = \frac{k-1}{f}, k \in \mathbb{N}\}$ ✓

4

5 $\rightarrow y = \left(\frac{y-x-1}{y-x-\omega} \right)! \quad \frac{y-x-1}{y-x-\omega} \in \mathbb{N} \rightarrow y-x-1 \in y-x-\omega$

6 $\rightarrow y-x-1 \in y-x-\omega$

7 $D_f = \{x \mid x = \frac{y-\omega k}{y-1k}, k \in \mathbb{N}\} \rightarrow x(y-1k) \in y-\omega k$

8 $\rightarrow x \in \frac{y-\omega k}{y-1k}$

9

10

11

12

