

الف) $y = \sqrt{\frac{x}{4} - \left[\frac{x}{4}\right]} \Rightarrow R_f \in [0, 4]$

$0 \leq \frac{x}{4} - \left[\frac{x}{4}\right] < 1$

ب) $\log y = \sin x + 4 \Rightarrow y = 10$

$\sin x + 4 \rightarrow 3 \leq \sin x + 4 \leq 5$

$\Rightarrow y = 10^{\min} \rightarrow R_f \in [10^3, 10^5]$

$\hookrightarrow 10^{\max}$

$\sqrt{\frac{x^2 - 4}{x^2 - 4}} \Rightarrow [0, \frac{4}{9}] \cup (1, +\infty)$

$R_f \in [0, \frac{4}{9}] \cup (1, +\infty)$

$a + b + c \Rightarrow \boxed{\frac{5}{3}}$ جواب

الف) $x < 0 \rightarrow x + \frac{1}{x} \leq -2$ $x > 0 \rightarrow x + \frac{1}{x} \geq 2$

$D_f \in [0, +\infty)$

$f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}}$

$[2, +\infty)$ $[2, +\infty)$

$\Rightarrow R_f \in [2 + 2\sqrt{2}, +\infty)$

ب) $-\sin^2 x + 2\sin x + 3$

$\begin{cases} \sin x = -1 \Rightarrow 0 \\ \sin x = 1 \Rightarrow 4 \\ \sin x = \frac{b}{a} = 1 \end{cases}$

$R_f \in [0, 4]$

$D_f \in \{1, 2, 3, \dots, 9\}$

$f(1) + f(2) + \dots + f(9) \Rightarrow \frac{9 \times 10}{9} + \left(-\frac{1}{9}\right) (1 + 2 + \dots + 9) = 90 - 15 = \boxed{75}$ جواب

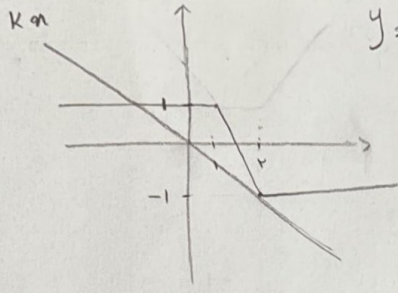
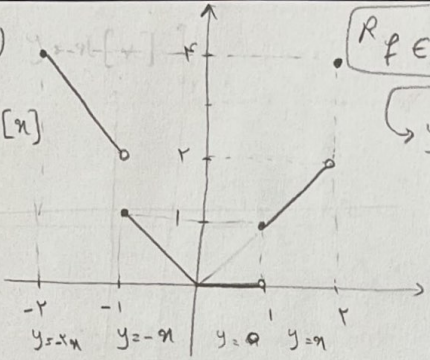
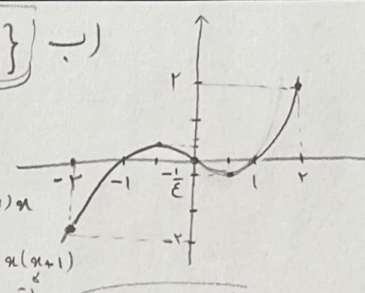
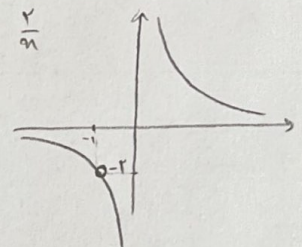
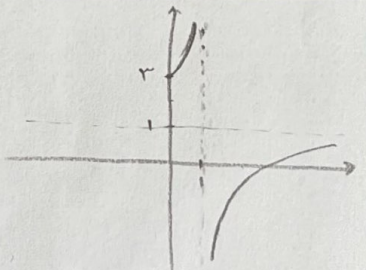
$-\frac{1}{9} \times \frac{9 \times 10}{2} = -15$

$f(x) = \sqrt{K(x-2)}$

$= \sqrt{ax^2 + bx + c}$

$f(2) = \sqrt{K(2-2)} = 0$

$g(x) = \sqrt{x^2 + 4} \Rightarrow R_g \in [2, +\infty)$

 $y = Kx \rightarrow (2, -1) \rightarrow -1 = 2K \rightarrow \boxed{K = -\frac{1}{2}}$ جواب	9
الف) $y = x[x]$  ب) $R \notin \mathbb{R} - \{2, 4, 10, \dots\}$ $y = x x - x$ ⊕ $x^2 - x = (x-1)x$ ⊖ $-x^2 - x = -x(x+1)$  $R \notin \mathbb{R}$	7
$y = \frac{x+1 + x+1}{x^2+x} = \frac{2x+2}{x^2+x} = \frac{2(x+1)}{x(x+1)} = \frac{2}{x}$ $\frac{2}{x} \xrightarrow{x \neq 0, -1} -2 \notin \mathbb{E}$ $D \notin \mathbb{R} - \{0, -1\}$ $R \notin \mathbb{R} - \{0, -2\} \rightarrow a+b = \boxed{-2}$ جواب 	1
$f(x) = \frac{(\sqrt{x}-1)(\sqrt{x}-c)}{(\sqrt{x}-1)^2} = \frac{\sqrt{x}-c}{\sqrt{x}-1} \Rightarrow \sqrt{x} < +\infty$ $\sqrt{x} \geq 0 \rightarrow \frac{c}{\sqrt{x}} \rightarrow \frac{c}{\sqrt{x} \rightarrow +\infty} = 0$ $D \notin \mathbb{E} [0, +\infty) - \{1\}$ $R \notin \mathbb{E} (-\infty, 1) \cup [c, +\infty)$ جواب 	9
$\frac{x^2 + 2x^2 - x - 2}{-x^2 - x^2} = \frac{3x^2 - x - 2}{-2x^2}$ $\frac{x-1}{x^2 + 2x + 2} = \frac{x-1}{(x+1)(x+2)}$ $D \notin \mathbb{R} - \{\pm 1\}$ $R \notin \mathbb{R} - \{1, 2\}$ $1+c = \boxed{2}$ جواب $f(x) = \frac{(x-1)(x+1)(x+2)}{(x-1)(x+1)(x+2)} = \frac{1}{x+2}$ $\begin{cases} x=1 & y=1 \\ x=2 & y=1 \end{cases}$	1.