

الف) $\frac{1}{x-2} \Rightarrow \frac{1}{x-2} = \frac{1}{x-2} \Rightarrow R_f = (-\infty, 2) \cup (2, \infty)$

ب) $\frac{1}{x} + \frac{1}{x} = \frac{2}{x} \Rightarrow R_f = [2, \infty)$
 $\frac{1}{x} + \frac{1}{x} = \frac{2}{x} \Rightarrow \frac{2}{x} \geq 2 \Rightarrow x \leq 1$

ج) $y = \frac{x^2 + 2x - 2}{x + 2} \Rightarrow xy + 2y = x^2 + 2x - 2 \Rightarrow x^2 + (2-y)x - 2 - 2y = 0$

$x = \frac{-2 + \sqrt{4 - 4(-2-2y)}}{2} \Rightarrow x = \frac{-2 + \sqrt{4 + 8 + 8y}}{2} \Rightarrow x = \frac{-2 + \sqrt{12 + 8y}}{2}$
 $\Delta = 4 - 4(-2-2y) \geq 0 \Rightarrow 4 + 8 + 8y \geq 0 \Rightarrow 12 + 8y \geq 0 \Rightarrow y \geq -\frac{3}{2}$
 $R_f = [-\frac{3}{2}, \infty)$

د) $x^2 - x + 1 = 0 \Rightarrow \Delta = 1 - 4 = -3 < 0$
 $\Rightarrow R_f = \emptyset$

ه) $\frac{1}{x} \Rightarrow \frac{1}{x} = \frac{1}{x} \Rightarrow R_f = [0, 1]$
 $\frac{1}{x} \geq 0 \Rightarrow x > 0$
 $\frac{1}{x} \leq 1 \Rightarrow x \geq 1$
 $R_f = [1, \infty)$

الف) $\frac{1}{\sqrt{x}} \Rightarrow \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{x}} \Rightarrow R_f = (-\infty, 0) \cup (0, \infty)$
 $\sqrt{x} \geq 0 \Rightarrow x \geq 0$
 $R_f = [0, \infty)$

ب) $y = \sqrt{x^2 - 1} \Rightarrow y = \sqrt{x^2 - 1} \Rightarrow R_f = [-1, \infty)$
 $y \geq 0 \Rightarrow x^2 - 1 \geq 0 \Rightarrow x \leq -1 \text{ or } x \geq 1$
 $R_f = [-1, \infty)$

الف) $\log(x^2 + 1) \Rightarrow R_f = \mathbb{R} \Rightarrow \log \Rightarrow R_f = \mathbb{R}$

ب) $\log\left(\frac{x^2 + 1}{x}\right) \Rightarrow \log \Rightarrow R_f = [1, \infty)$
 $\frac{x^2 + 1}{x} \geq 1 \Rightarrow x^2 + 1 \geq x \Rightarrow x^2 - x + 1 \geq 0$
 $\Delta = 1 - 4 = -3 < 0$
 $R_f = [1, \infty)$

الف) $-x-1$ $x-5$ $x+1$ $R_f = [-5, +\infty)$ ب) $R_f = [5, +\infty)$	مسئله یک تابع گامی است	6
الف) $x+1$ $-x$ $-x-1$ $\begin{cases} x \sqrt{-1} \\ x > -\frac{1}{1} \end{cases} \rightarrow x \in \mathbb{R} - (-1, -\frac{1}{2})$	x	7
x_0 $-\frac{1}{1}$ 0 $x-1$ $x+1$ -1 $x-1$ $y \sqrt{-1}$ y_0 -1 y $R_f = \mathbb{R}$		8
الف) $[x] + [1-x]$ $y = [x] + [1-x] + c$ ب) $y = c x - [x]$ $-[x] \sqrt{-1} \Rightarrow c x + 1$ $-1 \sqrt{x} \sqrt{0} \Rightarrow c x + 1$ $0 \sqrt{x} \sqrt{1} \Rightarrow c x$ $1 \sqrt{x} \sqrt{1} \Rightarrow c x - 1$	$R_f = [1, 1]$ $R_f = [-1, 5]$	9
الف) $y = \sin^2 x - \sin x + 1$ ب) $y = \sin^2 x + \sin^2 x + 1$ $\sin^2 x$ $\sin^2 x$ $\sin^2 x$ $R_f = [0, 1]$ $R_f = [1, 1]$		10