

19,5

الف) $y = \frac{|x|+1}{|x|-2}$

$|x| = t$

$\Rightarrow \frac{t+1}{t-2} = y \Rightarrow t = \frac{2y+1}{y-1} \quad t \geq 0$

$\frac{1}{y} \leftarrow \frac{2y+1}{y-1} \geq 0$

$R_F = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$ ج.ا

$y = \frac{x^2+1}{|x|}$

$|x| = t \Rightarrow y = \frac{t^2+1}{t} = t + \frac{1}{t}, \quad t > 0$

$a + \frac{1}{a} \geq a \Rightarrow (t, +\infty) \quad R_F = [2, +\infty)$ ✓

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

$x^2 + (2-y)x - (2+2y) = 0$

$\Delta \geq 0 \rightarrow (2-y)^2 + 4(2+2y) \geq 0 \rightarrow R_F = (-\infty, -2] \cup [-2, +\infty)$

$\frac{x^2-x+\frac{1}{x}}{x^2-x+1}$

$\frac{x^2-x+\frac{1}{x}}{x^2-x+\frac{1}{x}+\frac{c}{x}} = \frac{(x-\frac{1}{x})^2}{(x-\frac{1}{x})^2+\frac{c}{x}} = \frac{a^2}{a^2+\frac{c}{x}}$

$\hookrightarrow \Delta < 0 \Rightarrow D_F = \mathbb{R}$ ✓

$\hookrightarrow [0, 1)$

$R_F = [0, 1)$ ✓

الف) $y = \sqrt{-x^2+4x-1}$

$-(x^2-4x+1) + 2-2$

$y = \sqrt{-(x-2)^2+3} \xrightarrow{x=2} y=\sqrt{3}$

$\ominus \rightarrow \mathbb{R} = [0, \sqrt{3}]$ ✓

$y = \sqrt[3]{2x^2-1}$

$y^3 = 2x^2-1 \Rightarrow x^2 = \frac{y^3+1}{2}$

$\rightarrow x=2 \rightarrow y = \sqrt[3]{7} \leq \frac{1}{2}$

$\mathbb{R} = [-2, +\infty)$ ✓

$y = \log(x^2-x+1)$

الف) $x^2-x+1 > 0$

$\hookrightarrow (0, +\infty)$ بازه

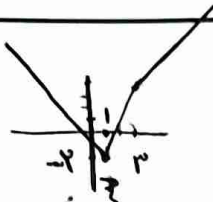
$R_F = \mathbb{R}$ ✓

ج.ا) $\log_p(\frac{x^2+1}{x}) = \log_p(x + \frac{1}{x})$

$x + \frac{1}{x} (x > 0) \rightarrow x + \frac{1}{x} \geq 2$

$y \geq \log_p 1 \quad R_F = [1, +\infty)$ ✓

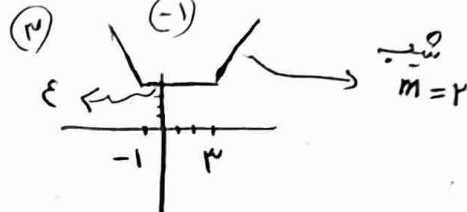
$$y = |m-2| - |m-3|$$



$$\begin{aligned} -m-1 & \quad m < 1 \rightarrow (1, -2) \\ m-2 & \quad 1 \leq m < 3 \rightarrow (2.5, -1) \\ m+1 & \quad m \geq 3 \rightarrow (3, 0) \end{aligned}$$

$$R_f = [-2, +\infty)$$

$$y = |m-2| + |m+1|$$



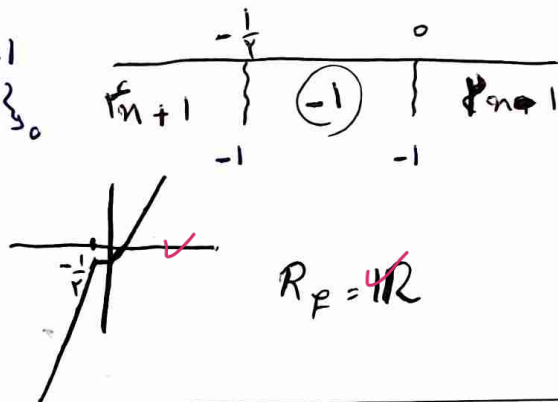
$$R_f = [\varepsilon, +\infty)$$

$$|m-2| - |m+2| \leq 1$$

$$\Rightarrow R_f = (-\infty, -2] \cup [-\frac{1}{2}, +\infty)$$

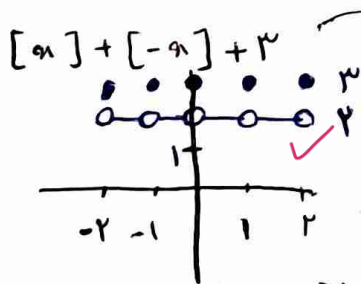
$$\begin{aligned} m < -1 : (2-m) - (-m-2) &\leq 1 \Rightarrow m+4 \leq 1 \Rightarrow m \leq -3 \\ -1 \leq m < 2 : (2-m) - (m+2) &\leq 1 \Rightarrow -2m \leq 1 \Rightarrow m \geq -\frac{1}{2} \\ m \geq 2 : (m-2) - (m+2) &\leq 1 \Rightarrow -4 \leq 1 \Rightarrow m \geq -8 \end{aligned}$$

$$y = |m-1| - |m+1| + |m|$$



$$R_f = \mathbb{R}$$

$$y = [m] + [2-m]$$

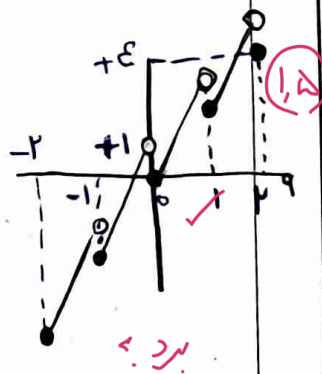


$$R_f = \{0, 2\}$$

$$\mathbb{Z} \rightarrow [m] + [2-m] = 0$$

$$y = |m-1| - [m]$$

$$\begin{aligned} -2 \leq m < -1 & \rightarrow |m-1| - [m] = m+2 \\ -1 \leq m < 0 & \rightarrow |m-1| - [m] = m+1 \\ 0 \leq m < 1 & \rightarrow |m-1| - [m] = m \\ 1 \leq m < 2 & \rightarrow |m-1| - [m] = m-1 \\ m = 2 & \rightarrow |m-1| - [m] = 1 \end{aligned}$$



$$y = \sin^2 m - \sin^2 m+1$$

$$R_f = [0, 1]$$

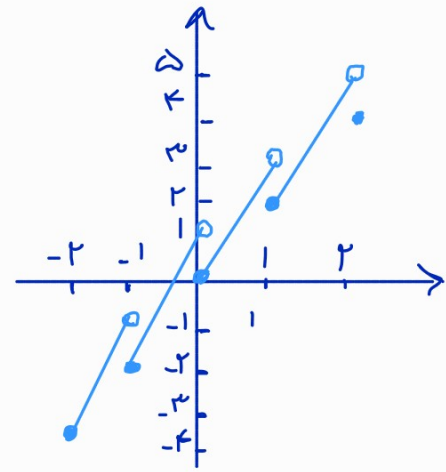
$$\begin{aligned} +1 & \rightarrow 1 \\ -1 & \rightarrow 0 \\ +\frac{1}{2} & \rightarrow \frac{3}{4} \end{aligned}$$

$$R_f = [\frac{3}{4}, 1]$$

$$y = \sin^2 m + \sin^2 m+1$$

$$\begin{aligned} +1 & \rightarrow 2 \\ 0 & \rightarrow 1 \\ -\frac{1}{2} & \rightarrow \frac{3}{4} \end{aligned}$$

$$R_f = [1, 2]$$



$$R_y = [-4, \infty)$$