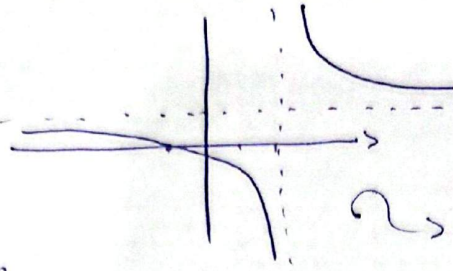


$$y = \frac{|x|+1}{|x|-2}$$



سوال ۱۵

$$R = (-\infty, -\frac{1}{2}) \cup (1, +\infty)$$

$$y = \frac{x^2+1}{|x|} \xrightarrow{x>0} x + \frac{1}{x} \rightarrow [2, +\infty)$$

$$x<0 \rightarrow -x - \frac{1}{x} \rightarrow [2, +\infty)$$

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

$$x^2+x(2-y)-2-2y=0 \rightarrow x = \frac{2-y \pm \sqrt{(2-y)^2-4(-2-2y)}}{2}$$

$$\Delta = (2-y)^2 - 4(-2-2y) = 4-4y+y^2+8+8y = y^2+4y+12$$

$$y^2+4y+12 \geq 0$$

$$(y+2)(y+6) \geq 0 \rightarrow y \leq -2 \text{ or } y \geq -6$$

$$(-\infty, -2) \cup (-6, +\infty)$$

سوال ۲:

$$f(x) = \frac{x^2-x+\frac{1}{x}}{x^2-x+1} \rightarrow D_f = \mathbb{R}$$

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

$$(y-1)x^2 + x(1-y) + y - \frac{1}{x} = 0$$

$$x = \frac{y-1 \pm \sqrt{(y-1)^2 - 4(y-\frac{1}{x})}}{2(y-1)}$$

$$\Delta = (1-y)^2 - 4(y-\frac{1}{x})$$

$$y^2+1-2y-4y+\frac{4}{x} = y^2-6y+\frac{4}{x}$$

$$-3y^2+3y \geq 0$$

$$3y(-y+1) \geq 0$$

$$\frac{0}{-1+1} \rightarrow \mathbb{R} = [0, 1]$$

سوال ۳:

$$y = \sqrt{-x^2+4x-1}$$

$$\max \left| \frac{-4}{-2} \right| = 2 \rightarrow (-\infty, 2] \rightarrow \mathbb{R} = (0, \sqrt{3}]$$

$$\sqrt{2x^2-11x}$$

$$\min \left| \frac{-\frac{11}{2}}{-2} \right| = 2 \rightarrow [-2, +\infty)$$

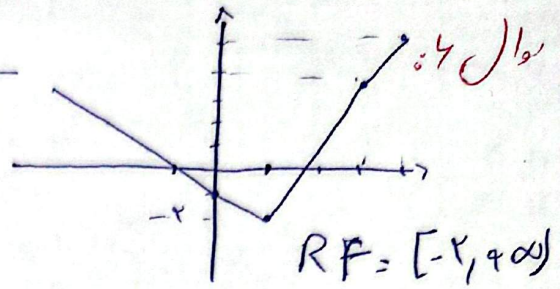
سوال ۴:

الف) $y = \log(x^3 - x + 1) \rightarrow \mathbb{R} = \mathbb{R}_f$

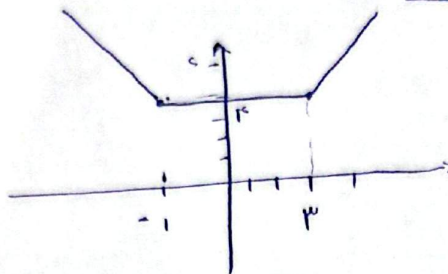
سوال ٥:

ب) $y = \log_p \frac{x^3 + 1}{x} \geq 0 \Rightarrow \min_{\log_p} 1 \rightarrow n + \frac{1}{n} \geq 2 \rightarrow \mathbb{R}_f = [1, +\infty)$

ج) $y = |2x - 2| - |x - 3|$
 $x = 1$ $x = 3$



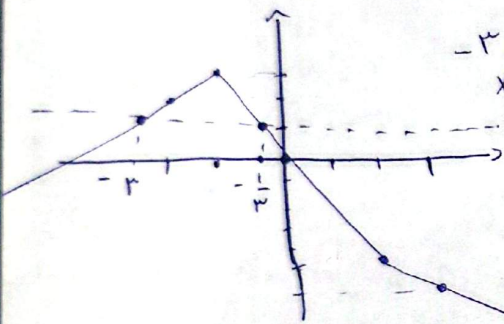
د) $y = |x - 3| + |x + 1|$
 $x = 3$ $x = -1$



هـ) $y = |x - 3| - |2x + 2|$
 $x = 3$ $x = -1$

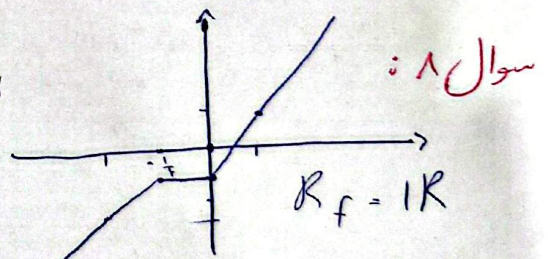
$\mathbb{R}_f = [2, +\infty)$

و) $|x - 2| - |2x + 2| \leq 1$
 $x = 2$ $x = -1$

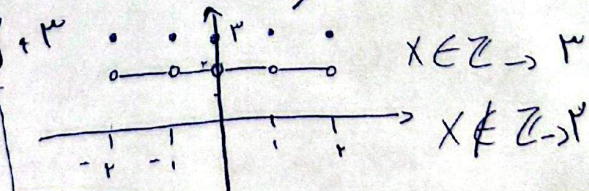


$-3x \leq 1 \Rightarrow x \geq -\frac{1}{3}$
 $x + 2 = 1 \Rightarrow x = -1$
 $(-\infty, -1] \cup [-\frac{1}{3}, +\infty)$

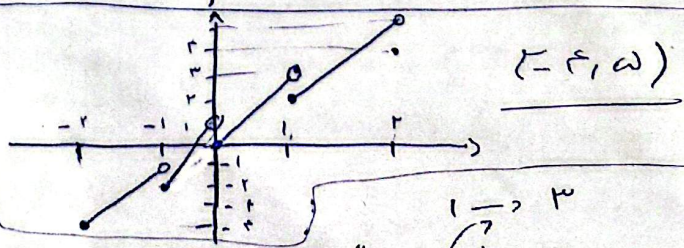
ز) $y = 3x - |2x + 1| + |x|$
 $x = -\frac{1}{2}$ $x = 0$



ح) $y = [x] + [3 - x] \rightarrow [x] + [-x] + 3$
 $x \in \mathbb{Z} \rightarrow 3$



ط) $y = 3x - [x]$
 $-2 \leq x < -1 \rightarrow 3x + 2$
 $-1 \leq x < 0 \rightarrow 3x + 1$
 $0 \leq x < 1 \rightarrow 3x$
 $1 \leq x < 2 \rightarrow 3x - 1$
 $x = 2 \rightarrow 3x - 2$



ث) $y = \sin^2 x - \sin x + 1$
 $x = 1$ $x = -1$
 $\mathbb{R} = [\frac{\pi}{2}, \frac{3\pi}{2}]$

سوال ١٠: $y = \sin^2 x + \sin x + 1$
 $[-\frac{1}{2}, 1]$
 $[0, 1] \cup [1, \frac{\pi}{2}] = \mathbb{R}$