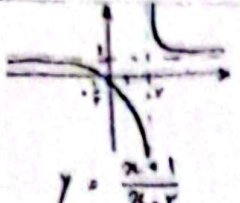
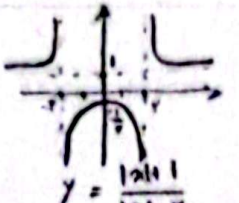


نام و نام خانوادگی: کلاس: شماره: تکلیف شماره:
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الف) $y = \frac{|x+1|}{|x-2|}$   $R_f = \mathbb{R} - \left\{ \frac{1}{2}, 1 \right\}$

ب) $y = \frac{x^2+1}{|x|}$ $x > 0 \Rightarrow y = \frac{x^2+1}{x} = x + \frac{1}{x} \Rightarrow y \geq 2$ $x < 0 \Rightarrow y = \frac{x^2+1}{-x} = -\left(x + \frac{1}{x}\right) \Rightarrow y \leq -2$ $R_f = [2, +\infty) \cup (-\infty, -2]$

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

$x = \frac{y-2 \pm \sqrt{(y-2)^2 + 4(2y+2)}}{2}$ $y^2 - 4y + 4 + 8y + 8 \geq 0 \Rightarrow y^2 + 4y + 12 \geq 0$

$(y+4)(y+3) \geq 0 \Rightarrow y \leq -4 \text{ or } y \geq -3$ $R_f = \mathbb{R} - (-4, -3)$

$f(x) = \frac{x^2-x+\frac{1}{x}}{x^2-x+1}$ $f(x) = \frac{(x-\frac{1}{x})^2}{(x-\frac{1}{x})^2+\frac{2}{x}} = y$ $(x-\frac{1}{x})^2 = t \Rightarrow y = \frac{t}{t+\frac{2}{x}}$

$yt + \frac{2}{x}y = t \Rightarrow \frac{2}{x}y = (1-y)t \Rightarrow t = \frac{2y}{1-y}$ $(x-\frac{1}{x})^2 = \frac{2y}{1-y}$

$x - \frac{1}{x} = \pm \sqrt{\frac{2y}{1-y}} \Rightarrow x = \pm \sqrt{\frac{2y}{1-y}} + \frac{1}{x}$ $\frac{2y}{1-y} \geq 0 \Rightarrow -\frac{1}{2} \leq y \leq 1$

$R_f = [0, 1]$

دامنه؟ $D_f = \mathbb{R}$ متغیر مجزوه نیست

الف) $y = \sqrt{-x^2+4x-1}$ $y^2 = -x^2+4x-1 \Rightarrow x^2-4x+1+y^2=0$

$x = \frac{4 \pm \sqrt{16-4(1+y^2)}}{2}$ $16-4(1+y^2) \geq 0 \Rightarrow 4y^2 \leq 12 \Rightarrow y^2 \leq 3 \Rightarrow -\sqrt{3} \leq y \leq \sqrt{3}$

$R_f = [0, \sqrt{3}]$

ب) $y = \sqrt[3]{x^2-4x}$ $x^2-4x = y^3 \Rightarrow x^2-4x-y^3=0 \Rightarrow x = \frac{4 \pm \sqrt{16+4y^3}}{2}$

$4 \pm \sqrt{16+4y^3} \geq 0 \Rightarrow \sqrt{16+4y^3} \geq -4 \Rightarrow y^3 \geq -1 \Rightarrow y \geq -1$ $R_f = [-1, +\infty)$

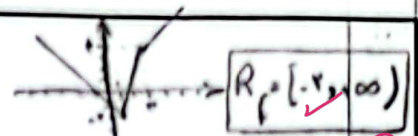
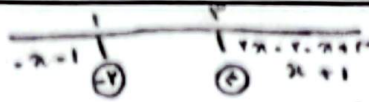
الف) $y = \log(x^2-x+1)$ $-\infty < x^2-x+1 < +\infty \Rightarrow \frac{\log}{x^2-x+1} \Rightarrow -\infty < \log(x^2-x+1) < +\infty$

$R_f = \mathbb{R}$

ب) $y = \log\left(\frac{x^2+1}{x}\right)$ $\frac{x^2+1}{x} = x + \frac{1}{x} \geq 2 \text{ or } x + \frac{1}{x} \leq -2 \Rightarrow \frac{\log}{x} \Rightarrow \log\left(\frac{x^2+1}{x}\right) \geq 0$

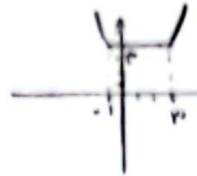
$R_f = [1, +\infty)$

الف) $y = |2x-2| - |x-2|$



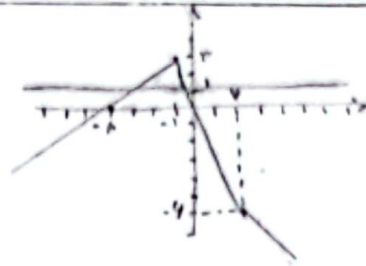
$R_f = [0, \infty)$

ب) $y = |x-2| + |x+1|$ نقطه صفر



$R_f = [1, \infty)$

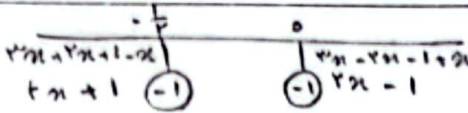
$y = |x-2| - |3x+2|$



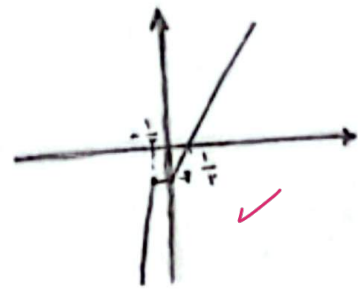
$-3x \leq 1 \quad x \geq -\frac{1}{3}$
 $x+2 \leq 1 \quad x \leq -1$

$x = \mathbb{R} - (-1, -\frac{1}{3}]$

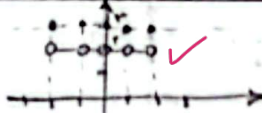
$y = 3x - |2x+1| + |x|$



$R_f = \mathbb{R}$

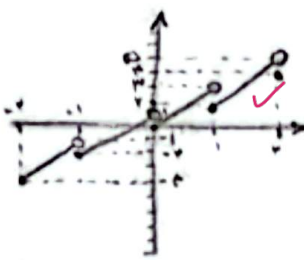


الف) $y = [x] \cdot [2-x] \quad y = [x] + [-x] + 2$



$R_f = \{2\}$

ب) $y = 3x - [x]$



$R_f = [-1, \infty)$

الف) $y = \sin^2 x - \sin x + 1$

$\max \rightarrow \sin x = 1 \quad y = 1 - 1 + 1 = 1$
 $-\frac{b}{2a} \rightarrow \sin x = \frac{1}{2} \quad y = \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4}$
 $\min \rightarrow \sin x = -1 \quad y = 1 + 1 + 1 = 3$

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

ب) $y = \sin^2 x + \sin^2 x + 1$

$\max \rightarrow \sin^2 x = 1 \quad y = 1 + 1 + 1 = 3$
 $-\frac{b}{2a} \rightarrow \sin^2 x = -\frac{1}{2}$ غير ممكن قبل
 $\min \rightarrow \sin^2 x = 0 \quad y = 1$

$R_f = [1, 3]$