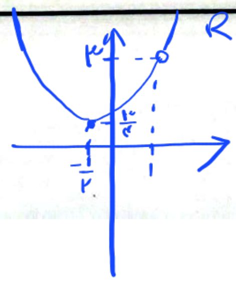
الف) $y = 3\sin x + 2\cos x \to -\sqrt{9+4} \le y \le \sqrt{13} \to R_f = [-\sqrt{13}, \sqrt{13}]$ ب) $y = 4\sin x - 3\cos x \to -\sqrt{16+9} \le y \le \sqrt{25} \to R_f = [-5, 5]$ ج) $y = [\underbrace{2\sin x + 5\cos x}_{k}] \to -\sqrt{4+25} \le k \le \sqrt{29} \to R_f = [-6, 5] \to$ نقط اعداد صحیح د) $y = \sqrt{\underbrace{\cos x - 2\sin x}_{k}} \to -\sqrt{5} \le k \le \sqrt{5} \to R_f = [~~-5^{\frac14}~~ 0, 5^{\frac14}]$	۱,۵	۶
$y = \sin^2 x + 3\sin x + 2$ $\sin max = 1 \to y = 1+3+2 = 6$ $\sin min = -1 \to y = 1-3+2 = 0$ $\frac{-b}{2a} = \frac{-3}{2}$ (غیرق ق) $\to y = \frac{9}{4} + \frac{-9}{2} + 2 = \frac{-1}{4}$ $R_f = [~~-\frac14~~ 0, 6]$ ب) $y = 2\sin^2 x + 3\sin x + 2$ $\sin max = 1 \to y = 2+3+2 = 7$ $\sin min = -1 \to y = 2-3+2 = 1$ $\frac{-b}{2a} = \frac{-3}{4} \to y = \frac{9}{8} - \frac{9}{4} + 2 = +\frac{7}{8}$ $R_f = [\frac{7}{8}, 7]$	۱,۵	۷
الف) $y = \sin^2 x + 4\cos^2 x = \sin^2 x + \cos^2 x + 3\cos^2 x = 3\cos^2 x + 1$ $\to 0 \le \cos^2 x \le 1 \to 1 \le 3\cos^2 x + 1 \le 4 \to R_f = [1, 4]$ ب) $y = \frac{2\cot x}{1+\cot^2 x} = \frac{2\cos x}{\sin x} \times \sin^2 x = 2\cos x \sin x = \sin 2x \to R_f = [-1, 1]$	۲	۸
الف) $y = \sin^6 x + \cos^6 x \to k = 3 \to 2^{-2} \le y \le 1 \to R_f = [\frac{1}{4}, 1]$ ب) $y = [\underbrace{\sin^8 x + \cos^8 x}_{k}] \to k = 4 \to 2^{-3} \le k \le 1 \to R_f = \{0, 1\}$	۲	۹
الف) $y = \frac{2x^2+7x-4}{x+4} \to yx + 4y = 2x^2 + 7x - 4 \to 2x^2 + (7-y)x - 4 + 4y = 0$ $(7-y)^2 + (8)(4y-4) \ge 0 \to y^2 - 14y + 49 + 32y - 32 \ge 0 \to y^2 + 18y + 17 \ge 0$ $(y+17)(y+1) \ge 0$ $R_f = (-\infty, -17] \cup [-1, +\infty)$ ب) $y = \frac{x^3-1}{x-1} = x^2 + x + 1 \to$ راس $\left\| \begin{matrix} -\frac{1}{2} \\ \frac{3}{4} \end{matrix} \right. \to a > 0 \to R_f = ~~[\frac{3}{4}, 1) \cup (1, +\infty)~~$ $x \ne 1$ ارزش min	۱,۵	۱۰

الف) $\frac{(x+4)(2x-1)}{x+4} \to x \ne -4 \to R = \mathbb{R} - \{-9\}$



$R = [\frac{3}{4}, +\infty)$

۱۷,۲۵

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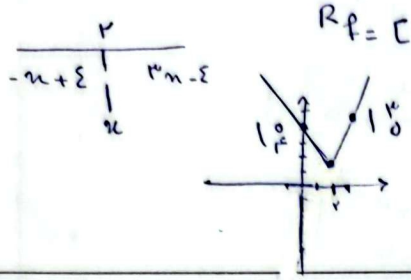
۱

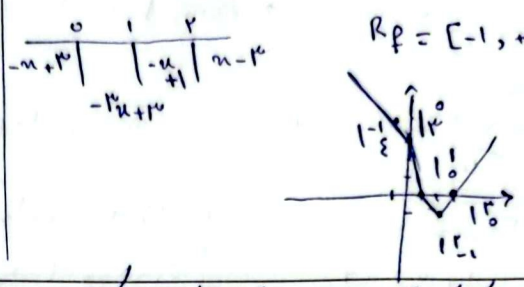
الف) $y = x + |2x - 4|$

$R_f = [2, +\infty)$



ب) $y = |x-2| + |x-1| - |x|$

$R_f = [-1, +\infty)$

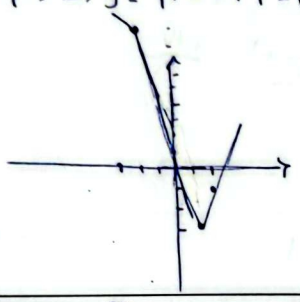


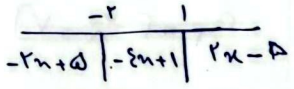
۲

y رسم $\rightarrow y = |2^x - 2^3| - |x+2|$

از نقاطی که یک خط افقی خودش را در یک نقطه قطع می‌کند

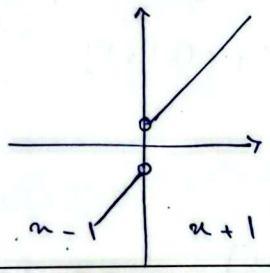
$y = -3$ است $\Leftarrow x = -3$



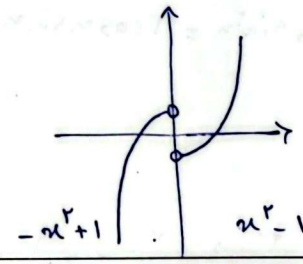


۳

الف) $y = x + \frac{x}{|x|}$ در $x=0$

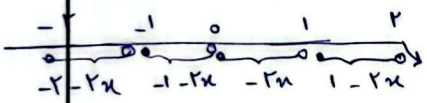


ب) $y = x|x| - \frac{x}{|x|}$

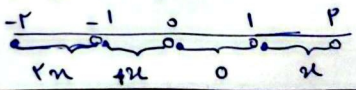


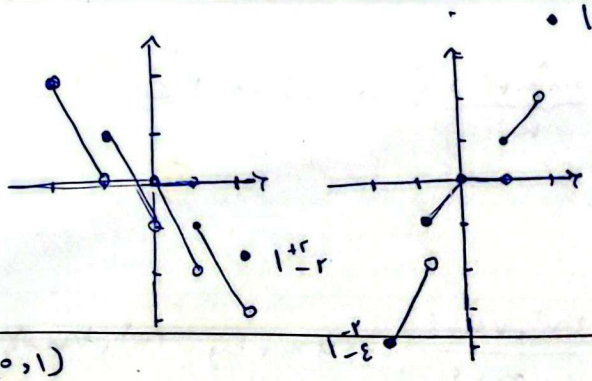
۴

الف) $y = [x] - 2x$



ب) $y = [x]|x|$





۵

الف) $y = 3x - [3x] \rightarrow R_f = [0, 1)$

ب) $y = 4x - 4[x] = 4(x - [x]) \rightarrow R_f = [0, 4)$

ج) $y = x - 5\left[\frac{x}{5}\right] = 5\left(\frac{x}{5} - \left[\frac{x}{5}\right]\right) \rightarrow R_f = [0, 5)$

د) $y = [2x) - 2x = -(2x - [2x]) \rightarrow R_f = (-1, 0]$