

المبدأ مسلّم تكليف متناهية

$$\left. \begin{aligned} f(-x) &= x f(x) = 2|x|+1 \\ f(x) + x f(-x) &= 2|x|+1 \end{aligned} \right\} \times x \quad 11, \text{ و } 5$$

(2)

$$\Rightarrow x f(-x) - x^2 f(x) = \cancel{2|x|+1} \quad 2|x|+1$$

$$x f(-x) + f(x) = 2|x|+1$$

$$\Rightarrow -x^2 f(x) - f(x) = 2|x|+1 \quad x - 2|x|-1$$

$$\Rightarrow f(x) = \frac{2|x|+1 - 2|x|-1}{x^2+1} = \frac{0}{x^2+1} = 0$$

$$x=0 \Rightarrow 2f(0)=4 \Rightarrow f(0)=2$$

$$\Rightarrow f(x) = x^2 - 2x + 2 \Rightarrow f(x^2) = x^4 - 2x^2 + 2$$

$$x^2 + x + 2 = yx - y$$

$$x^2 + (1-y)x + y + 2 = 0$$

$$\Delta = (1-y)^2 - 4(y+2) \geq 0 \Rightarrow y^2 + 1 - 2y - 4y - 8 \geq 0$$

$$\Rightarrow y^2 - 4y - 7 \geq 0 \Rightarrow y \leq \frac{-1 - \sqrt{1+28}}{2} \quad \frac{-1 - \sqrt{29}}{2}$$

$$R_f = (-\infty -1] \cup [\sqrt{29} + \infty)$$

$$\text{الف) } y_{\min} = \frac{-\Delta}{4a} = \frac{-14}{1} \Rightarrow R_f = [-14 + \infty)$$

$$\text{ب) } x_{\max} = 2 \Rightarrow y_{\max} = 4 \Rightarrow R_f = [0, 4]$$

$$\text{ج) } \text{منحني كارتيزي} \rightarrow R \Rightarrow R_f = [0, +\infty)$$

$$\text{د) } \text{منحني قطبي} \rightarrow R \Rightarrow (0, 9) \rightarrow R_f = (-\infty, +\infty)$$

الف) $a \neq b \Rightarrow R_f = R - \left\{ \frac{a}{2} \right\} = R - \left\{ \frac{5}{2} \right\}$

ب) $a \neq b \Rightarrow R_f = \sqrt{R - \{4\}} = [0, +\infty) - \{2\}$

ج) $\frac{x^2+3+1}{\sqrt{x^2+3}} = \sqrt{x^2+3} + \frac{1}{\sqrt{x^2+3}} \xrightarrow{\min} \sqrt{3} + \frac{1}{\sqrt{3}} = \frac{4}{\sqrt{3}}$

$\Rightarrow R_f = \left[\frac{4}{\sqrt{3}}, +\infty \right)$

د) $x^2+4 + \frac{1}{x^2+4} - 4 \xrightarrow{\min} \frac{1}{4} - 4 = -\frac{15}{4} \Rightarrow R_f = \left[-\frac{15}{4}, +\infty \right)$

هـ) $3x^2+4 = yx^2-y \Rightarrow x^2(3-y) + 4+y = 0 \Rightarrow (3-y)x^2 + y + 4 = 0$

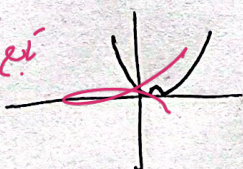
$\Delta \geq 0 \Rightarrow 0 - 4(3-y)(3-y) \geq 0 \Rightarrow -4(-y^2-y+12) \geq 0$
 $\Rightarrow y^2+y-12 \geq 0 \Rightarrow \frac{-4 \pm \sqrt{16+48}}{2} = \frac{-4 \pm 8}{2} \Rightarrow R_f = (-\infty, -4] \cup [3, +\infty)$

و) $\min_{x=0} \frac{0+4}{0-1} = -4$ $\max_{x=+\infty} \frac{3(+\infty)}{+\infty} = 3$
 $R_f = (-\infty, -4] \cup (3, +\infty)$

$\min z = \frac{-2+5}{-1-3} = -\frac{1}{2}$ $\max z = \frac{5+4}{1-2} = -3$

$R_f = [-3, -\frac{1}{2}]$

الف) تابع محدود نیست

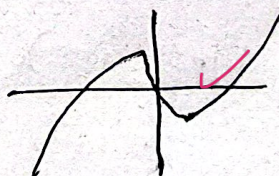


$R_f = [0, +\infty)$

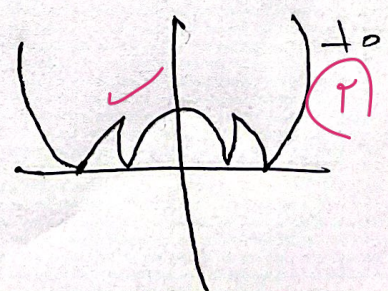
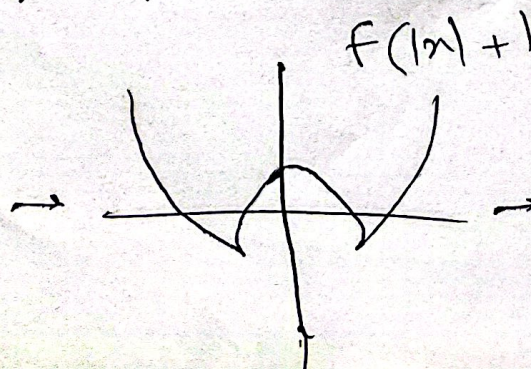
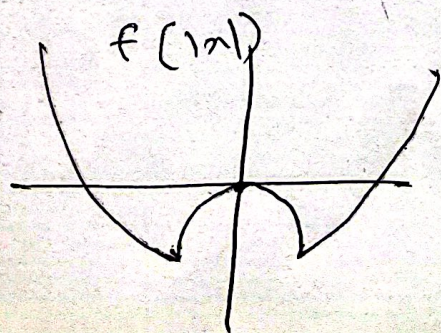
ب) $\sqrt{\frac{9(x-2)}{4(x-2)}} \geq \sqrt{\frac{9}{4}} = \frac{3}{2}$

$R_y = \left\{ \frac{3}{2} \right\}$

$y \geq x^2 - 2x \quad x \geq 0$
 $y \leq -x^2 - 2x \quad x < 0$



$R_f = R$



9- روش اول: $y n^2 - y = 3n^2 + 4 \rightarrow (y-3)n^2 = y+4$

$$n^2 = \frac{y+4}{y-3} \geq 0 \rightarrow \frac{-4}{+} \frac{3}{-} \Rightarrow R_y = (-\infty, -4] \cup (3, +\infty)$$

کون

روش دوم: $\square = n^2 \rightarrow \begin{cases} n^2 = 0 \rightarrow y = -4 \\ n^2 \sim \infty \rightarrow y = 3 \end{cases} \xrightarrow[\text{مغفله}]{\text{مخرج میونه}} R_y = (-\infty, -4] \cup (3, +\infty)$

8- اول برد عبارت داخل قدر مطلق
 رد حساب می کنیم بعد قدر مطلق می گیریم
 فقط حواس باشد که $y = \frac{3}{4}$ هم هست داخل برد
 $y = -\frac{3}{4}$ عضو برد عبارت داخل قدر مطلق هست و وقتی قدر مطلق بگیریم $y = \frac{3}{4}$
 رو دیده بهمونی؟

