

جواب لیس

$$f(-x) - x f(x) = r|x| + 1 \quad f(x) = ? \quad (1)$$

$$x \rightarrow f(-x) - x f(x) = r|x| + 1$$

$$-x \rightarrow (f(x) + x f(-x) = r|-x| + 1 = r|x| + 1) \times -\frac{1}{x} =$$

$$f(x) + x f(-x) = r|x| + 1 \quad \frac{x - \frac{1}{x}}{x} - \frac{f(x)}{x} - f(-x) = \frac{-r|x| - 1}{x}$$

$$\begin{aligned} \rightarrow f(-x) - x f(x) &= r|x| + 1 \\ \rightarrow -\frac{f(x)}{x} - f(-x) &= \frac{-r|x| - 1}{x} \end{aligned} \quad \left. \vphantom{\begin{aligned} \rightarrow f(-x) - x f(x) &= r|x| + 1 \\ \rightarrow -\frac{f(x)}{x} - f(-x) &= \frac{-r|x| - 1}{x} \end{aligned}} \right\} + \rightarrow -x f(x) - \frac{f(x)}{x} = r|x| + 1 - \frac{r|x| - 1}{x}$$

$$\frac{-x^r f(x) - f(x)}{x} = \frac{r|x|x + x - r|x| - 1}{x}$$

$$-\frac{f(x)(x^r + 1)}{x} = \frac{r|x|(x - 1) + (x - 1)}{x}$$

$$-\frac{f(x)(x^r + 1)}{x} = \frac{(x - 1)(r|x| + 1)}{x} \rightarrow f(x) = \frac{(x - 1)(r|x| + 1)}{-(x^r + 1)}$$

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Gleichung

(4)

$$f(x) + f(0) = x^r - r|x| + 4 \quad f(x^r) = ?$$

$$x=0 \rightarrow f(0) + f(0) = 4 \rightarrow f(0) = 2$$

$$f(x) + 2 = x^r - r|x| + 4 \rightarrow x^r \rightarrow f(x^r) = (x^r)^r - r(x^r) + 2$$

$$y = \frac{x^r + x + r}{x-1} \rightarrow yx - y = x^r + x + r$$

(5)

$$x^r + x - yx + r + y = 0$$

$$\text{REEF GROUP} \quad x^r + x(1-y) + r + y = 0$$

علیٰ صفریان

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

در داخل قدر مطلق همواره مثبت است.

$$0 \leq (1-y)^2 - 4(r+y) \rightarrow 0 \leq y^2 - 2y + 1 - 4y - 4r - 4 \rightarrow 0 \leq y^2 - 6y - 3 - 4r$$

$$0 \leq y^2 - 6y - 3 - 4r \rightarrow \frac{-1}{+0} \quad \frac{+3}{-0} \quad \frac{+4r}{+0}$$

$$R_f = (-\infty, -1] \cup [3, +\infty) \quad (y-3)(y+1)$$

(K)

$$\text{الف) } y = 2x^2 - 5x + 1 \rightarrow \text{ext} \left| \begin{array}{l} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{array} \right.$$

$$\text{ext} \left| \begin{array}{l} \frac{+5}{4} \end{array} \right.$$

$$y = 2\left(\frac{5}{4}\right)^2 - 5\left(\frac{5}{4}\right) + 1 = \frac{25}{8} - \frac{25}{4} + 1 = -\frac{25}{8} + 1 = -\frac{17}{8}$$

$$= -\frac{17}{8}$$

$$R_f = (-\infty, -1] \cup [v, +\infty) \quad (y-v)(y+1)$$

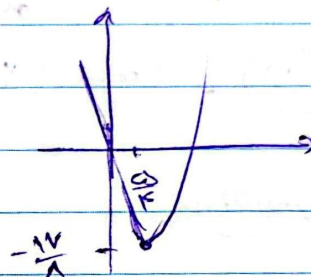
(F)

$$\text{ii) } y = x^2 - 2x + 1 \rightarrow \text{ext} \left| \begin{array}{l} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{array} \right.$$

$$\text{ext} \left| \begin{array}{l} \frac{+1}{2} \\ \frac{+1}{4} \end{array} \right.$$

$$y = 1\left(\frac{1}{2}\right)^2 - 2\left(\frac{1}{2}\right) + 1 = \frac{1}{4} - \frac{2}{2} + 1 = -\frac{1}{4} + 1 = \frac{3}{4}$$

$$= -\frac{1}{4}$$

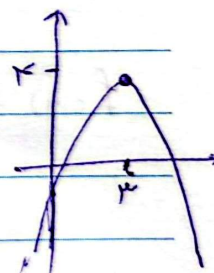


Graph of the parabola (F)

$$R_f = \left[-\frac{1}{4}, +\infty\right)$$

$$\text{iii) } y = \sqrt{-x^2 + 4x - 2}$$

$$y = -x^2 + 4x - 2 \rightarrow \text{ext} \left| \begin{array}{l} -\frac{4}{-2} = 2 \\ -\frac{(-4) + 16 - 2}{-4} = 1 \end{array} \right.$$



$$R_f = [0, 1]$$

REEF GROUP

حل المسائل

$$2) y = \sqrt{x^3 - 3x^2 + 4x + 1}$$

من أجل أن يكون تحت الجذر مربع كامل، نحتاج إلى أن يكون المقدار تحت الجذر مربعاً كاملاً. $\mathbb{R}$ المجال هو $\mathbb{R}$

$$0 \leq x^3 - 3x^2 + 4x + 1 \rightarrow R_f = [0, 2 + \infty)$$

$$2) f(x) = (x^3 - 4x^2 + 7x + 4)$$

$$x^3 - 4x^2 + 7x + 4 > 0 \xrightarrow{\text{دالة متزايدة}} R_{f(x)} = \mathbb{R}$$

$$الف) y = \frac{3x+1}{2x-4} \rightarrow \text{جداً قابل$$

$$R_{f(x)} = \mathbb{R} - \left\{ \frac{3}{2} \right\} \rightarrow R_{f(x)} = \mathbb{R} - \left\{ \frac{3}{2} \right\}$$

$$ب) y = \sqrt{\frac{4x+1}{x-2}} \xrightarrow{\text{مربع الطرفين}} y^2 = \frac{4x+1}{x-2} \rightarrow x = \frac{y^2+1}{y-2}$$

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

$$y = t + \frac{1}{t} \rightarrow \min t = \sqrt{4} \rightarrow \sqrt{4} + \frac{1}{\sqrt{4}} = \frac{5}{2}$$

REEF GROUP

$$2) R_f = \left[\frac{r\sqrt{r}}{r}, +\infty \right)$$

$$1) y = x^r + \frac{1}{x^r + r} \rightarrow x^r + \frac{1}{x^r + r} + r - r = y$$

$$y = \underbrace{x^r + r}_t + \frac{1}{\underbrace{x^r + r}_t} - r \Rightarrow t + \frac{1}{t} \rightarrow \min f = r \quad (x=0)$$

$$t + \frac{1}{t} \rightarrow \left[\left(r + \frac{1}{r} \right) - r, +\infty \right) = \left[\frac{1}{r}, +\infty \right)$$

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

(4)

$$y x^r - y = r x^r + r \rightarrow r x^r - y x^r + y + r = 0 \quad : \text{der } f$$

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

$$0 \leq \frac{y + r}{y - r} \rightarrow \frac{-r}{+} - \frac{r}{-} \rightarrow R_f = (-\infty, -r] \cup (r, +\infty)$$

$$\square \Rightarrow x^r$$

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$$\min_{x^r=0}$$

$$\max_{x^r=+\infty}$$

$$y = -r$$

$$y = r$$

$$x^r : 1 = 0 \rightarrow x^r = 1 \rightarrow x = \pm 1$$

معرفه‌ای از 0 و 1

$$R_f = (-\infty, -r] \cup (r, +\infty)$$

در خارج از بازه

حل المسألة

$$f(x) = \frac{r \sin x + r}{\sin x - r} \rightarrow \frac{aB + b}{cB + d} \text{ من}$$

(7)

دستور را به دست آوریم.

$$\sin x = -1 \rightarrow \min = -1 \rightarrow y = \frac{-r + r}{-1 - r} = \frac{r}{-r} = -1$$

$$\rightarrow \max = 1 \rightarrow y = \frac{r + r}{1 - r} = \frac{2}{1 - r} = -r$$

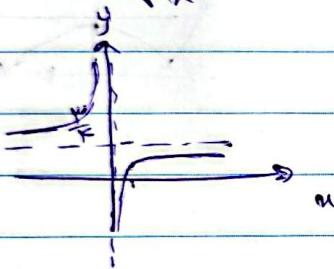
$$\sin x - r = 0 \rightarrow \sin x \neq r$$

مخرج صفر نباشد

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

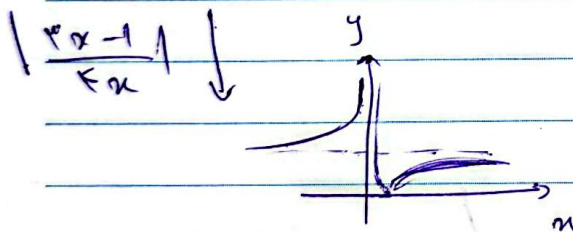
$$\text{الف) } y = \left| \frac{r x - 1}{r x} \right| \rightarrow y = \frac{r x - 1}{r x} \rightarrow \text{جواب را بنویس}$$

(1)



$$x = 1$$

$$y = \frac{r}{r} = 1$$



$$R_f = R^+ = [0, +\infty)$$

$$R_f = (-\infty, -\frac{r}{r}) \cup (-\frac{r}{r}, \frac{r}{r}) \cup (\frac{r}{r}, +\infty)$$

$$\rightarrow y = \sqrt{\frac{rx - 1}{-1 + rx}} \xrightarrow{\text{مربع کردن}} y^2 = \frac{rx - 1}{-1 + rx}$$

$$x = \frac{1 y^2 - 1}{r y^2 - r} \rightarrow \text{ب} \rightarrow y^2 \rightarrow \min = 0 \rightarrow x = r$$

$$\rightarrow \max = +\infty \rightarrow x = r$$

$$\text{پ} \rightarrow \sqrt{x} = \sqrt{\frac{1 y^2 - 1}{r y^2 - r}} \rightarrow \frac{1 y^2 - 1}{r y^2 - r} \geq 0 \rightarrow \frac{1 y^2 - 1}{r y^2 - r} \geq 0 \rightarrow \frac{1 y^2 - 1}{r y^2 - r} \geq 0$$

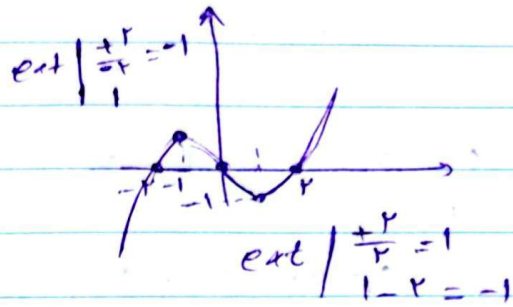
REEF GROUP

حل المسألة

$$y = x|x| - rx$$

(9)

$$y = \begin{cases} x^2 - rx & x \geq 0 \\ -x^2 - rx & x < 0 \end{cases}$$

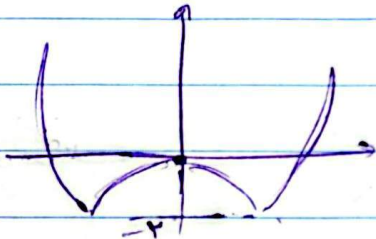


$$R_f = \mathbb{R}$$

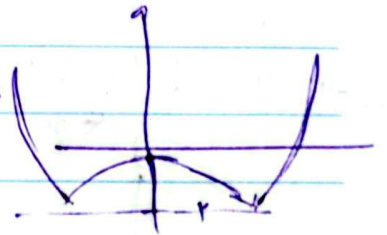
$$y = |f(|x|) + 1|$$

(10)

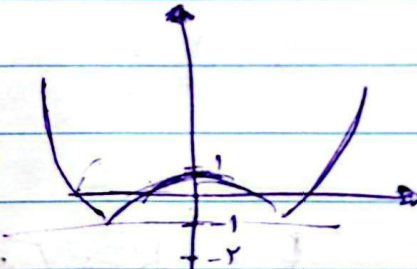
$$y = f(x)$$



$$\rightarrow y = f(|x|) \Rightarrow$$



$$y = f(|x| + 1) \Rightarrow$$



$$y = |f(|x| + 1)| \Rightarrow$$

