

1A, 2

جواب لیا

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

$$f(x) = ?$$

(1) (2)

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

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

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

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

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

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

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

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

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Gleichung

$$f(x) + f(0) = x^r - r|x| + r$$

$$f(x^r) = ?$$

(r) (y)

$$x=0 \rightarrow f(0) + f(0) = r \rightarrow f(0) = \frac{r}{2}$$

$$f(x) + \frac{r}{2} = x^r - r|x| + r \rightarrow x^r \rightarrow f(x^r) = (x^r)^r - r(x^r) + \frac{r}{2}$$

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

(r) (w)

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

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

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علیٰ عزیزان

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

در داخل قدر مطلق همواره مثبت است.

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

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

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

$$(y-3)(y+1)$$

(K)

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

$\text{ext} \left| \begin{array}{l} \frac{+5}{2} \end{array} \right.$

$$y = 2\left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) + 1 = \frac{25}{2} - \frac{25}{2} + 1 = -\frac{25}{2} + 1 = -\frac{23}{2}$$

$= -11.5$

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

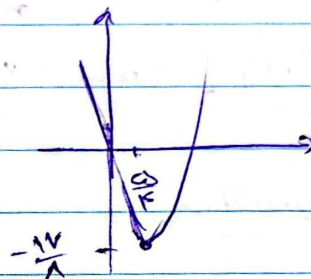
(F)

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

$$\text{ext} \quad \left| \begin{array}{l} \frac{+d}{2r} \\ \frac{+d^2}{4r} \end{array} \right.$$

$$y = r\left(\frac{d}{2r}\right)^2 - d\left(\frac{d}{2r}\right) + 1 = \frac{d^2}{4r} - \frac{rd}{r} + 1 = -\frac{d^2}{4r} + 1 = -\frac{rk}{4}$$

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



gizlen nokta

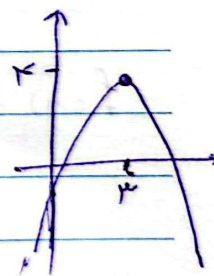
(r)

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

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

$$y = -x^2 + 4x - 2 \quad \rightarrow \quad \text{ext} \quad \left| \begin{array}{l} -\frac{b}{2a} = 2 \\ -(9) + 16 - 2 = 5 \end{array} \right.$$

$$R_y = (-\infty, 5]$$



$$R_f = [0, 5] \checkmark$$

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حل المسائل

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

من أجل أن يكون المجال حقيقيًا، نحتاج إلى أن يكون السائل موجبًا أو صفرًا.

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

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

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

٥) ٤

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

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

$$ب) y = \sqrt{\frac{4x+1}{x-2}} \quad \text{مقلوب} \quad y^2 = \frac{4x+1}{x-2} \rightarrow x = \frac{y^2+1}{y-2}$$

$$ب) R_y = \sqrt{\mathbb{R} - \{2\}} = [0, +\infty) - \{2\}$$

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

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

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

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

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

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

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

(2) (4)

$$y x^r - y = r x^r + r \rightarrow r x^r - y x^r + y + r = 0$$

: حل

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

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

$$\square \Rightarrow x^r$$

: حل

$$\min |x^r = 0|$$

$$\max |x^r = +\infty|$$

$$y = -r$$

$$y = r$$

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

معظمه 0 و 1

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

جواب

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حل المسألة

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

(2) (7)

در صورتی که دامنه

$$\sin x = -1 \rightarrow \min = -1 \rightarrow y = \frac{-r + r}{-1 - r} = \frac{0}{-1 - r} = -\frac{1}{r}$$

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

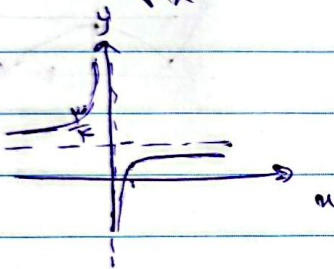
$$\sin x - r = 0 \rightarrow \sin x \neq r$$

مخرج صفر نشود

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

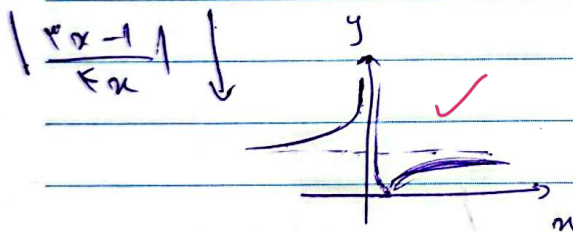
$$الف) y = \left| \frac{rx - 1}{rx} \right| \rightarrow y = \frac{rx - 1}{rx} \rightarrow \text{جواب$$

(1) (1)



$$rx = 1$$

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



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

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

$$\rightarrow y = \sqrt{\frac{rx - 1}{-1 + rx}} \rightarrow y^2 = \frac{rx - 1}{-1 + rx}$$

$$rx = 1 \rightarrow y^2 \rightarrow \min = 0 \rightarrow x = r$$

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

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

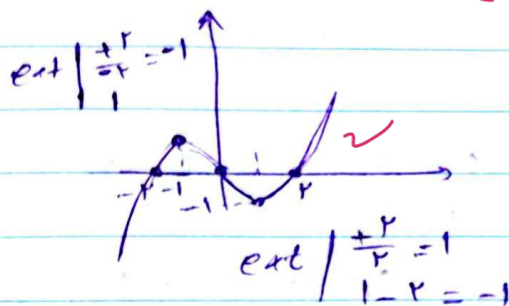
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$$y = x|x| - rx$$

(2) (9)

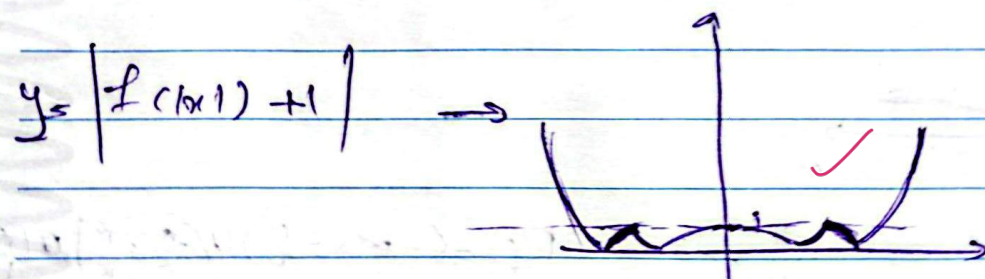
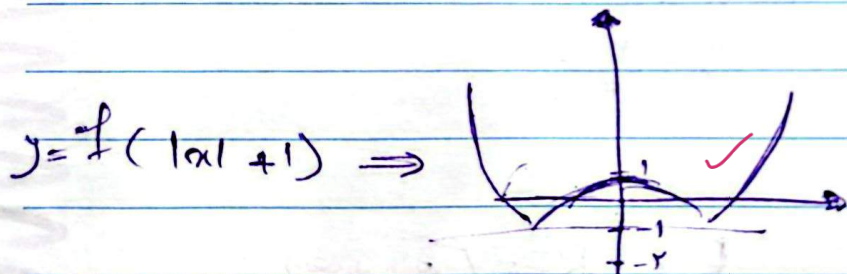
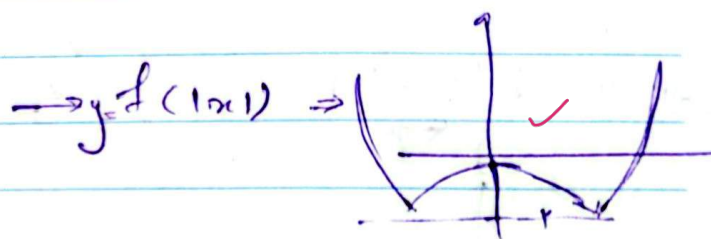
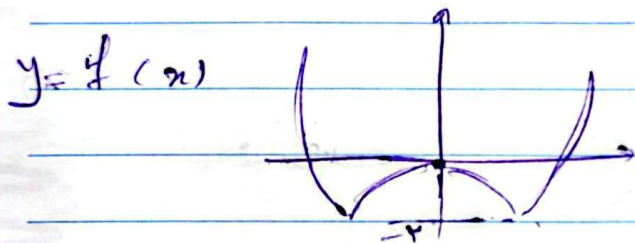
$$y = \begin{cases} x^2 - rx & x \geq 0 \\ -x^2 - rx & x < 0 \end{cases}$$



$$R_f = 12 \checkmark$$

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

(2) (10)



$$1-ب) y = \sqrt{\frac{4(n-r)}{r(n-r)}} = \sqrt{\frac{4}{r}} = \frac{r}{r} \Rightarrow R_y = \left\{ \frac{r}{r} \right\}$$