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① $f(1-n) - nf(m) = 2m+1$ مقرر عام مرفوعاً (1)

$\hookrightarrow f(m) + mf(1-n) = 2m+1$ املا لازم نبعد قدر معلق روبطا

② $nf(m) + m^2 f(1-n) = 2m^2 + m$ (2) $f(1-n) + m^2 f(1-n) = 2m+1 + 2m^2 + m$

$\hookrightarrow f(1-n)(2m^2+1) = 2m^2 + 2m+1 \rightarrow f(1-n) = \frac{2m^2 + 2m+1}{2m^2+1}$

$f(m) = \frac{2m^2 - 2m+1}{2m^2+1}$ صفحة اخذ

$f(m) + f(0) = 2m^2 - 2m + 4 \xrightarrow{m=0}$ (2) (2)

$2f(0) = 4 \rightarrow f(0) = 2 \rightarrow f(m) = 2m^2 - 2m + 2 \rightarrow f(m) = 2m^2 - 2m + 2$

$y = \frac{2m^2 + m + 2}{m-1}$ (2) (2) $\rightarrow ym - y - 2m^2 - m - 2 = 0 \rightarrow$

$2m^2 + m(1-y) + 2+y = 0 \rightarrow m = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow m = \frac{y-1 \pm \sqrt{y^2 - 4y + 1 - 4 - 4y}}{2}$

$y^2 - 4y - 3 \geq 0 \rightarrow$ + 0 - 0 + $Ry = [-\infty, -1] \cup [3, +\infty)$

الف $y = 2m^2 - 2m + 2 \rightarrow$ $\text{cat} \begin{cases} -\frac{b}{2a} = \frac{\omega}{2} \\ f(\frac{2\omega}{4}) - (\frac{2\omega}{2}) + \frac{2}{1} = -\frac{14}{1} \end{cases}$

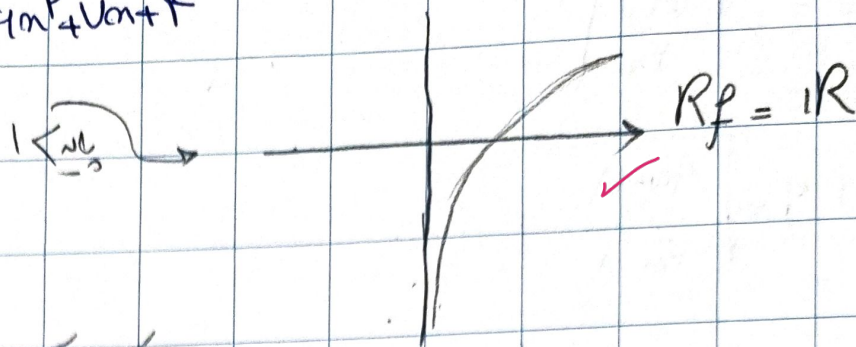
$\min \rightarrow Ry = [-\frac{14}{1}, +\infty)$ (2) (2)

ب) $y = \sqrt{-2m^2 + 4m - 2} \rightarrow$ $\text{cat} \begin{cases} -\frac{b}{2a} = 1 \\ -9 + 14 - \omega \leq 2 \end{cases}$

$\max \rightarrow Ry = \sqrt{(-\infty, 2]} = [0, 2]$

ج) $y = \sqrt{2m^2 - 2m + 2} \rightarrow Ry = \sqrt{1R} = [0, +\infty)$

$$2) y = \log n^k - qn^k + \ln n + k$$



$$الف) y = \frac{kn+1}{kn-4} \xrightarrow{\text{محدوداتیب}} R_f = IR - \left\{ \frac{4}{k} \right\}$$

(2) (3)

$$ب) y = \sqrt{\frac{kn+1}{n-4}} \xrightarrow{\text{محدوداتیب}} R_f = \sqrt{IR - \{4\}} \rightarrow R_f = [0, +\infty) - \{2\}$$

$$ج) y = \frac{n^k + k \rightarrow +\infty}{\sqrt{n^k + k}} = \frac{\sqrt{n^k + k} + 1}{\sqrt{n^k + k}} \xrightarrow{n \rightarrow 0} \frac{1}{\sqrt{k}} = \frac{k\sqrt{k}}{k}$$

$$R_y = \left[\frac{k\sqrt{k}}{k}, +\infty \right)$$

$$د) y = n^k + \frac{1}{n^k + k} + k - k \rightarrow \lim_{n \rightarrow \infty} = k + \frac{1}{k} = \frac{k^2 + 1}{k} \xrightarrow{-k} \frac{1}{k}$$

$$R_y = \left[\frac{1}{k}, +\infty \right)$$

$$y = \frac{kn^k + k}{-k \frac{n^k - 1}{k}} \xrightarrow{\text{محدوداتیب}}$$

$$yn^k - y = kn^k + k \rightarrow$$

(2) (4)

$$n^k(y - k) = ky \rightarrow n = \pm \sqrt{\frac{y+k}{y-k}}$$

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

(2) (4)

$$n^k \rightarrow +\infty \rightarrow -k$$

$$\left. \begin{array}{l} +\infty \\ -k \end{array} \right\} \xrightarrow{\text{محدوداتیب}} R_f = (-\infty, -k] \cup (k, +\infty)$$

$$f(m) = \frac{k \sin m + k}{\sin m - k}$$

$$\xrightarrow{\sin m \rightarrow \pm 1} \left[\begin{array}{l} +1 \rightarrow -k \\ -1 \rightarrow \frac{-1}{k} \end{array} \right] \xrightarrow{\text{محدوداتیب}}$$

(2) (5)

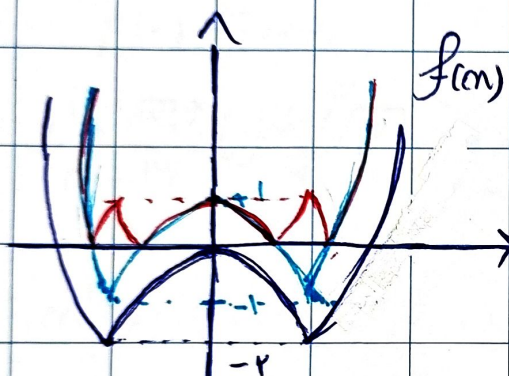
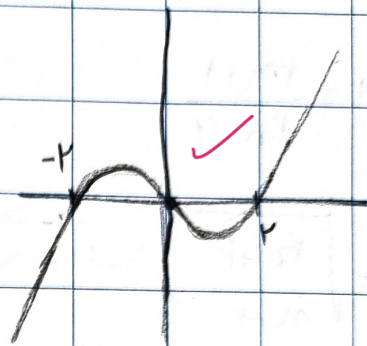
$$R_f = \left[-k, \frac{-1}{k} \right]$$

الف) $g = \left| \frac{m-1}{m} \right|$ همنوع $y = \frac{3}{x}$ $R_g = [0, +\infty)$ (2) 11

ب) $y = \sqrt{\frac{4m-11}{m-1}} = \sqrt{\frac{4(m-2)}{m(m-2)}} \xrightarrow{m \neq 2} y = \frac{2}{\sqrt{m}} \rightarrow R_f = \left\{ \frac{3}{2} \right\}$

$y = m|m| - 2m \rightarrow \begin{cases} m \geq 0 : m^2 - 2m \\ m < 0 : -m^2 - 2m \end{cases}$

$R_g = \mathbb{R}$



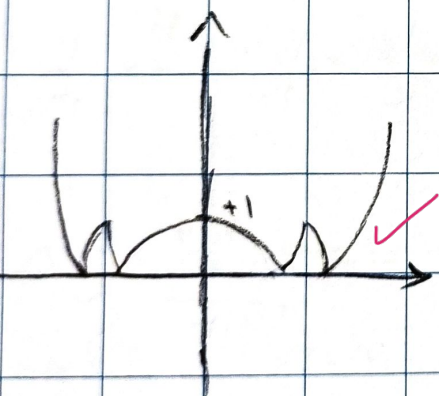
$y = |f(m)| + 1$

1) اول قدر صغلی منوال اعمال من کنیم که تابع به شکل قبل فرماد.

2) سپس تابع را یک واحد بالا می بریم.

3) سپس قدر صغلی خود را کل ضابطه را میزنیم.

← شکل نهایی:



۱- بجای n ، $-n$ قرار می دهیم و یک دستگاه می سازیم:

$$\begin{aligned} f(-n) - n^r f(n) &= 2|n| + 1 \xrightarrow{\times n} \begin{cases} n^r f(-n) - n^{r+1} f(n) = 2n|n| + n & (I) \\ f(n) + n^r f(-n) = 2|n| + 1 & (II) \end{cases} \\ f(n) + n^r f(-n) &= 2|n| + 1 \end{aligned}$$

$$\underline{II - I} \rightarrow (1 + n^r) f(n) = 2(1 - n)|n| + 1 - n \Rightarrow f(n) = \frac{(1 - n)(2|n| + 1)}{1 + n^r}$$