

①

$$f(m) - xf(m) = r|m| + 1 \rightarrow f(-(-m)) - (-x)f(-n), r|-n| + 1$$

$$f(m) + xf(-n) = r|m| + 1$$

$$f(-x) - xf(m) = r|m| + 1 \xrightarrow{-x} xf(-n) - x^2 f(m) = r|x| + 1$$

$$xf(-n) + f(m) = r|m| + 1 \rightarrow xf(-n) + f(m) = r|m| + 1$$

$$(x^r + 1)f(m) = r|m| + 1 - r|x|m - n \xrightarrow{n>} r_{m+1} - r_{m^r} - n = -r_{m^r} + x_{+1}$$

$$\rightarrow f(m) = \begin{cases} \frac{-r_{m^r} + x_{+1}}{x^r + 1} & n > \\ \frac{r_{m^r} - r_{m+1}}{x^r + 1} & n < \end{cases}$$

$$\xrightarrow{n<} -r_{m+1} + r_{m^r} - n, r_{m^r} - r_{m+1}$$

②

$$f(m) + f(0) = x^r - r_m + 4 \rightarrow rf(0), 4 \rightarrow f(0), r \rightarrow f(m), x^r - r_m + r$$

$$\rightarrow f(m^r), (m^r)^r - r(m^r) + r \rightarrow f(m^r), x^r - r_{m^r} + r$$

③

$$y = \frac{x^r + n + r}{x - 1} \Rightarrow yx - y = x^r + n + r \rightarrow x^r + (1 - y)n + r + y = 0$$

$$\Delta > 0 \rightarrow (1 - y)^2 - 4(y + r) = y^r - 4y + 1 - 4y - 4r \rightarrow y^r - 4y - 4r$$

$$-(y - r)/(y + 1) \geq 0 \rightarrow \frac{-1}{+1} - \frac{r}{+1} \rightarrow R = (-\infty - 1] \cup [r \infty)$$

④

$$1) y = r_{m^r} - \Delta m + 1 \rightarrow -\frac{b}{ra} = \frac{\Delta}{K} \rightarrow r \times \frac{r\Delta}{1q} - \frac{r\Delta}{K} + 1 = -\frac{r\Delta}{K} - \frac{r\Delta}{\Sigma} + 1 = -\frac{rV}{K}$$

$$R = [-\frac{rV}{K} + \infty)$$

$$\rightarrow y = \sqrt{-x^r + 4x - \infty} \rightarrow \frac{-4}{-r}, r \rightarrow -4 + 1x - 0 = r - R, (-\infty \in)$$

$$\rightarrow \sqrt{R} \rightarrow [0 \ r] \rightarrow y \in [0 \ r]$$

$$2) y = \sqrt{x^r - r_{m^r} + r_{m+1}} \rightarrow r_1 > r_2 < 1R \rightarrow y = [0 \ +\infty)$$

$$3) y = \log \frac{x^r - 4m^r + Vm + \Sigma}{r} \rightarrow R = (-\infty + \infty) = \mathbb{R}$$

الف) $y = \frac{x^{r+1}}{x^r - 4} \rightarrow R = \mathbb{R} - \{\frac{2}{r}\}$

ب) $y = \sqrt{\frac{x^{r+1}}{x^r - 4}} \rightarrow R = \mathbb{R} - \{\frac{2}{r}\} \rightarrow R_{\text{def}} = [0, +\infty) - \{\frac{2}{r}\}$

2) $y = \frac{x^r + r}{\sqrt{x^r + r}} = \sqrt{x^r + r} + \frac{1}{\sqrt{x^r + r}} \rightarrow R = [\sqrt{r} + \frac{\sqrt{r}}{r}, +\infty)$

3) $x^r + \frac{1}{x^r + \varepsilon} \rightarrow x^r + \varepsilon + \frac{1}{x^r + \varepsilon} - \varepsilon \rightarrow R = [\frac{1}{r} + r + \infty) - r = [\frac{1}{r} + \infty)$

$y = \frac{x^{r+1} + \varepsilon}{x^r - 1} \rightarrow$ روش اول: $y x^r - y = x^{r+1} + \varepsilon \rightarrow (x^r - y)x^r + (\varepsilon + y) = 0$
 $\rightarrow \Delta > 0 \rightarrow -\varepsilon(x^r - y)(\varepsilon + y) > 0 \rightarrow \frac{-\varepsilon}{x^r - 1} + \frac{\varepsilon}{x^r - 1} + \frac{\varepsilon}{x^r - 1} \rightarrow (-\infty - \varepsilon) \cup [\varepsilon + \infty)$
 روش دوم: $\rightarrow$ $\lim_{x \rightarrow \infty} y = +\infty \rightarrow \frac{r \cdot \infty + r}{\infty - 1} = \textcircled{3}$
 $\rightarrow$ $\lim_{x \rightarrow -1} y = 0 \rightarrow \frac{r}{-1} = \textcircled{-r}$
 می تواند منفرد $\rightarrow (-\infty - r) \cup [r + \infty)$

$f(m) = \frac{r \sin m + \varepsilon}{\sin m - \varepsilon} \rightarrow \begin{cases} \frac{r}{-r} = -r \\ -1 \cdot \frac{r}{-\varepsilon} = \frac{1}{r} \end{cases} \rightarrow R = [-r, -\frac{1}{r}]$

الف) $y = \left| \frac{x^m - 1}{x^m} \right| \rightarrow R = \left\{ \frac{r}{r} \right\} \rightarrow R = [0, +\infty)$

ب) $y = \sqrt{\frac{9m - 18}{x^m - 18}} = \sqrt{\frac{9(m-2)}{x^m - 18}} = \sqrt{\frac{9}{x^m}} = \frac{3}{x^m}$

$y = m|m| - x^m \rightarrow \begin{cases} m^2 - x^m \\ -m^2 - x^m \end{cases} \rightarrow R = \mathbb{R}$

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

