

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

(1)

$$f(x) + x f(-x) = r|x| + 1 \quad \left\{ \begin{array}{l} f(x) + x f(-x) = r|x| + 1 \\ f(x) + x^n f(x) = -r|x| + n + 1 \end{array} \right.$$

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

$$f(x) + f(0) = x^r - rx + r \quad f(0) = r \Rightarrow f(x) = x^r - rx + r$$

(2)

$$f(x) = x^r - rx + r \Rightarrow f(x^r) = x^{2r} - rx^r + r$$

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

(3)

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

$$x = \frac{y - 1 \pm \sqrt{y^2 - 4y - 4r}}{1 - y} \geq 0$$

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

$$\text{اذا } y = \frac{r_{n+1}}{r_n - 1} \Rightarrow \frac{-\Delta}{2a} = \frac{r_0 - 2(r)(1)}{1} = -\frac{1}{\lambda} \quad R = \left[-\frac{1}{\lambda}, +\infty\right)$$

(4)

$$\Rightarrow \sqrt{-x^r + 4n - 4} \Rightarrow \frac{-\Delta}{2a} = \frac{r_0 - 2(-1)(-1)}{-2} = \frac{+1}{-2} = -\frac{1}{2} \quad R = [0, 2]$$

$$\Rightarrow \log(x^r - 4n^r + 4n + 1) \Rightarrow x^r - 4n^r + 4n + 1 > 0 \quad R_f = \mathbb{R}$$

$$\text{اذا } y = \frac{r_{n+1}}{r_n - 1} \Rightarrow r_{n+1} - 4y = r_{n+1} \Rightarrow x(r_0 - r) = 4y + 1 \Rightarrow x = \frac{4y + 1}{r_0 - r} \quad R_f = \mathbb{R} - \left\{\frac{r}{r}\right\}$$

(5)

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

$$R_f = [0, +\infty) \setminus \{r\}$$

$$x = \frac{r^r + 1}{\sqrt{r^r + r}} = \frac{r^r + r}{\sqrt{r^r + r}} + \frac{1}{\sqrt{r^r + r}} = \sqrt{r^r + r} + \frac{1}{\sqrt{r^r + r}} \quad R_f = \left[\frac{r^r}{r}, +\infty\right)$$

$$x = \frac{1}{n^r + 1} \Rightarrow \frac{1}{n^r + 1} = \frac{1}{n^r + 1} - \frac{1}{n^r + 1} = 0 \quad R = \left[\frac{1}{r}, +\infty\right)$$

$$y = \frac{r^2 + 2}{r^2 - 1} \quad \text{for } 0 < r < 1 \Rightarrow y(r^2 - 1) = r^2 + 2 \Rightarrow r^2(y - 1) = y + 2 \Rightarrow r = \sqrt{\frac{y+2}{y-1}} \quad (6)$$

$$R = (-\infty, -1] \cup (1, +\infty)$$

for $0 < r < 1$, $x=0 \rightarrow y = -1$
 $x=+\infty \rightarrow y = 1$
 } $\rightarrow (-\infty, -1] \cup (1, +\infty)$
 (نقطه حذف می شود)

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

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

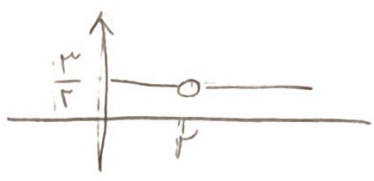
$$R_f = [-r, -\frac{1}{r}]$$

$$y = \left| \frac{r^2 - 1}{2r} \right|$$

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

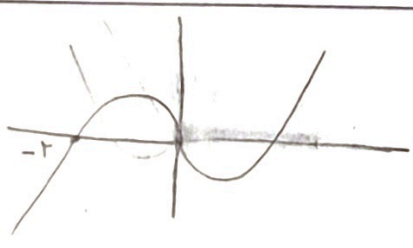
$$y = \sqrt{\frac{q(x+r)}{2(x-r)}}$$

$$R = \left\{ \frac{r}{2} \right\}$$



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

$-r(x+r)$



$$R_f = \mathbb{R}$$

