

الف) $y = m^2 - 5 \rightarrow m = \pm \sqrt{y+5} \rightarrow R_f = [-5, +\infty)$

(1)

ب) $y = m^2 + 1 \rightarrow m^2 = y - 1 \rightarrow m = \pm \sqrt{y-1} \rightarrow R_f = R$

الف) $y = m^2 - 2m + 2 \rightarrow y = (m-1)^2 + 1 \rightarrow y-1 = (m-1)^2 \rightarrow m-1 = \pm \sqrt{y-1} \rightarrow m = 1 \pm \sqrt{y-1} + 1$

(2)

$R_f = [1, +\infty)$

ب) $y = m^2 - 2m + 1 \rightarrow y = (m-1)^2 - \frac{1}{4} \rightarrow y + \frac{1}{4} = (m-1)^2 \rightarrow \sqrt{y + \frac{1}{4}} + \frac{1}{2} = m$

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

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

(3)

$m = \pm \sqrt{\frac{2+2y}{y-1}} \rightarrow \frac{2+2y}{y-1} \geq 0 \rightarrow \frac{2}{-1} - \frac{2}{1} + R_f = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$

ب) $y = \frac{2|m|+1}{|m|-1} \rightarrow y|m|-1 = 2|m|+1 \rightarrow |m| = \frac{2y+1}{y-2}$

$R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$

$y = \frac{1}{m^2 - 5m} \rightarrow y(m^2 - 5m) - 1 = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 144y^2 + 4y = 4y(36y+1)$

(4)

$4y(36y+1) \geq 0 \rightarrow R_f = (-\infty, -\frac{1}{36}] \cup [0, +\infty)$

الف) $y = m^2 - 4m + 2 \rightarrow \begin{matrix} \text{ext} \\ \text{min} \end{matrix} \left| \begin{matrix} -\frac{b}{2a} \\ -v \end{matrix} \right. \rightarrow \frac{2}{2} = 1 \rightarrow R_f = [-1, +\infty)$

(5)

ب) $y = -m^2 + 4m + 2 \rightarrow \begin{matrix} \text{ext} \\ \text{max} \end{matrix} \left| \begin{matrix} -\frac{b}{2a} \\ +\frac{4}{-2} \end{matrix} \right. \rightarrow \frac{-4}{-2} = 2 \rightarrow R_f = (-\infty, 2]$

ا) $y = \sqrt{-n^2 - 2n + 2} \rightarrow \min_{\text{ext}} \left| \frac{-1}{2n} = \frac{1}{2} \right| \rightarrow R_f = \sqrt{[-1, 1]} \rightarrow R_f = [0, +\infty)$ (6)

ب) $y = \sqrt{-n^2 - 2n + 1}$ $\frac{a < 0}{\text{max}}$ $\rightarrow \frac{-b}{2a} = \frac{-(-2)}{2(-1)} = 1$ $\rightarrow R_f = [0, \sqrt{1}]$

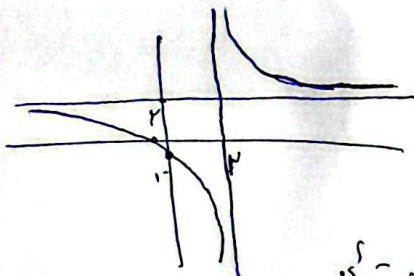
ج) $y = \sqrt{n^2 + 2n + 1} \rightarrow R_f = \mathbb{R}$ (✓)

د) $y = \sqrt{n^2 + 2n + 1} \rightarrow R_f = [0, +\infty)$

ا) $\frac{n^2 + 1}{n - 2} \rightarrow R - \left\{ \frac{a}{c} \right\} \rightarrow R_f = R - \{2\}$ (1)

ب) $\sqrt{\frac{2n+1}{n+2}} \rightarrow R - \{2\} \rightarrow [0, +\infty) - \{2\}$

ا) $y = \frac{n^2 + 1}{n - 2} \rightarrow$ $\frac{a}{c} = 2$ $\rightarrow$ $ad - bc < 0$ $\rightarrow$ $\frac{1}{c} = 2$ $\rightarrow$ $ad - bc < 0$ (7)



$y = \frac{1}{-2} \rightarrow n = 0$

$n^2 + 1 \geq 0 \rightarrow n \geq -1 \rightarrow n \geq -\frac{1}{2} \rightarrow y \geq 0$

ب) $y = \frac{2n - 1}{1 - 2n}$ $\frac{a}{c} = \frac{1}{2}$ $\rightarrow$ $ad - bc < 0$ $\rightarrow$ $y = \frac{-1}{-2} = \frac{1}{2} \rightarrow n = 0$

ج) $\cos^n + \frac{1}{\cos^n} \rightarrow R_f = [2, +\infty)$ (10) $\cos^n - 2 \geq 0 \rightarrow \cos^n \geq 2 \rightarrow n \geq \frac{1}{2} \rightarrow y \geq 0$

د) $\left(\frac{n^2 + 1}{n} \right)^{\frac{1}{n}} \rightarrow \left(n + \frac{1}{n} \right)^{\frac{1}{n}} \rightarrow f(n) = n + \frac{1}{n}$
 $n \neq 0$
 $f(n) = (-\infty, -\sqrt{2}] \cup [\sqrt{2}, +\infty)$

