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الف) $y = n^3 - 3n^2 + 3n - 1 \rightarrow y-1 = n^3 - 3n^2 + 3n - 2 \rightarrow y-1 = (n-1)^3 \rightarrow \sqrt[3]{y-1} = n-1$

✓ $R_f = \mathbb{R}$ بدليل فريدمان فرجيدو برابرا: $-\sqrt[3]{y-1} + 1 = n$

ب) $y = \frac{1}{n^2 - 2n} \rightarrow yn^2 - 2yn = 1 \rightarrow yn^2 - 2yn - 1 = 0 \xrightarrow{\Delta \text{ ليري}} n = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y}$

✓ $R_f = (-\infty, -1] \cup (0, +\infty)$ $n = \frac{y \pm \sqrt{y^2 + y}}{y}$

$y \neq 0, y^2 + y \geq 0$

$y(y+1) \geq 0$

الف) $n^2 - 4n + 10 \xrightarrow{a > 0} \begin{cases} n_{\min} = \frac{-b}{2a} = 2 \\ y_{\min} = 6 \end{cases} \rightarrow R_f = [6, +\infty)$ ✓

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ب) $y = -n^2 + 4n + 3 \xrightarrow{a < 0} \begin{cases} n_{\max} = \frac{-b}{2a} = 2 \\ y_{\max} = 11 \end{cases} \rightarrow R_f = (-\infty, 11]$ ✓

ج) $y = \sqrt{n^2 - 4n - 3} \xrightarrow{a > 0} \begin{cases} n_{\max} = \frac{-b}{2a} = 2 \\ y_{\max} = -1 \end{cases} \rightarrow R_f = \sqrt{[0, +\infty)} = [0, +\infty)$ ✓

د) $y = \sqrt{4n - n^2} \xrightarrow{a < 0} \begin{cases} n_{\max} = \frac{-b}{2a} = 2 \\ y_{\max} = 2 \end{cases} \rightarrow R_f = \sqrt{[-\infty, 4]} = [0, 2]$ ✓

الف) $n^2 - 5n^2 + 2n + 1 \rightarrow R_f = \mathbb{R}$ ✓

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ب) $y = n^2 - 9n^2 + 2n + 1 \rightarrow R_f = \mathbb{R}$ ✓

ج) $y = \sqrt{n^2 - 9n^2 + 2n + 1} \rightarrow R_f = [0, +\infty)$ ✓

د) $y = (n^2 - 9n^2 + 2n + 1)^2$?

الف) $y = \frac{2n+1}{n-2} \quad \frac{a}{c} = \frac{2}{-1} = -2$

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$R_f = \mathbb{R} - \{2\}$ ✓

ب) $y = \frac{2n+1}{n+1} \quad \frac{a}{c} = \frac{2}{1} = 2$

$R_f = \mathbb{R} - \{2\}$ ✓

