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IF, US

ماتریکس

$$g \circ f(n) = g(f(n)) \Rightarrow D_{g \circ f} = \{x \in D_f \mid f(n) \in D_g\} \quad (1)$$

$$I) D_f \Rightarrow f(n) = \sqrt[n]{n} \Rightarrow n^{1/n} > 1$$

$$n-1 > 0$$

$$n^{1/n} > n^{1/(n-1)}$$

$$I) n > 1$$

$$I \cap II = n > 1$$

$$\Rightarrow (n-1) > 1$$

$$II) n > 1$$

$$II) D_g \Rightarrow -x^2 + 4x - 5 > 0$$

$$\hookrightarrow \frac{x^2 - 4x + 5}{(x-2)^2} < 0 \Rightarrow \frac{x}{x-2} > 0 \Rightarrow D_g = \{1, 5\}$$

$$I \cap II = n > 1 \cap \{1, 5\} = \{5\} \Rightarrow D_{g \circ f} = \{5\}$$

$$f \circ g(n) = f(g(n)) \Rightarrow f(n^2 - 4n + 5) = (n^2 - 4n + 5)^{1/(n^2 - 4n + 5)} > 1 \quad (2)$$

$$= n^2 - 4n + 5 > 1$$

$$= n^2 - 4n + 11$$

$$g \circ f(n) = g(f(n)) \Rightarrow g(n^2 - 4n + 5) = (n^2 - 4n + 5)^{1/(n^2 - 4n + 5)} > 1$$

$$= n^2 - 4n + 5 > 1$$

$$= n^2 - 4n + 11$$

$$\Rightarrow n^2 - 4n + 11 = n^2 - 4n + 5 + 6$$

$$= n^2 - 4n + 5 + 6$$

$$\Rightarrow \Delta = 16 - 4 \cdot 5 = -4 < 0$$

$$\Rightarrow n = \frac{4 \pm \sqrt{-4}}{2} = 2 \pm i$$

$$\left(\frac{4 + \sqrt{1-4}}{2} \right)^2 = \frac{16 + 1 - 4 + 4\sqrt{1-4}}{4} = \frac{13 + 4\sqrt{1-4}}{4}$$

$$\Rightarrow \frac{13 + 4\sqrt{1-4} + 16 + 1 - 4 + 4\sqrt{1-4}}{4} = \frac{29 + 8\sqrt{1-4}}{4} = \frac{29}{4} = 7.25$$

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$$g(f(u)) = 5u^2 + 11$$

$$g(vu) = 5u^2 + 11$$

$$vu = t \Rightarrow u = \frac{t}{v}$$

$$g(t) = 5\left(\frac{t}{v}\right)^2 + 11 \Rightarrow \frac{5t^2}{v^2} + 11 \Rightarrow g(u) = \frac{5u^2}{v^2} + 11$$

$$g(u-v) = \frac{5(u-v)^2}{v^2} + 11$$

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$$f(g(u)) = 3u^2 - 4u + 1$$

$$f(u) = 3u - 5$$

$$\Rightarrow 3(g(u)) - 5 = 3u^2 - 4u + 1$$

$$3g(u) = 3u^2 - 4u + 6$$

$$g(u) = \frac{3u^2 - 4u + 6}{3}$$

$$\Rightarrow g \circ f(u) = g(f(u)) = \frac{3(3u-5)^2 - 4(3u-5) + 6}{3}$$

$$f \circ g(u) = 3u^2 - 4u - 1$$

$$g(u) = u^2 - 2u + 1$$

$$g \circ f = 9u^2 + 10 - 10u$$

$$\frac{9u^2 - 20u + 14 - 12u + 20 + 6}{3}$$

$$\frac{9u^2 - 32u + 20}{3}$$

$$\frac{3(3u^2 - 10u + 10)}{3}$$

$$\Rightarrow g \circ f(u) = 3u^2 - 10u + 10$$

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$$f \circ g(n) \mapsto (a, b)$$

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$$\hookrightarrow \frac{b-a}{a-b} = \frac{b}{-b} = -1 \mapsto y = -x + b$$

$$\Rightarrow f \circ g(n) = -x + b$$

$$f(g(n)) \mapsto (a, b)$$

$$\hookrightarrow f(0) = b$$

$$g(n) = 0$$

$$\hookrightarrow f \circ g(n) = -x + b$$

$$\hookrightarrow x = 0 \Rightarrow f \circ g(n) = b$$

$$\hookrightarrow f(\cdot) = b$$

$$y \circ g(\cdot) = 9 - 1 \varepsilon$$

$$\Rightarrow y \circ g(\cdot) = 1 \Rightarrow g(\cdot) = \varepsilon$$

$$f \circ g(n) = 4x + 1$$

$$f \circ g(n) = y = \frac{1}{a}x - 1$$

$$f(\cdot) - g(\cdot) = b$$

$$f(g(n)) \Rightarrow f(a) = 0$$

$$\Rightarrow g(n) = a$$

$$\frac{1}{a}x - 1 = 4x + 1 \rightarrow a = -\frac{1}{4}$$

$$f \circ g(n) = f(g(n)) \Rightarrow 9 \xrightarrow{y \circ g} 11 \xrightarrow{f \circ g} 22 \xrightarrow{f \circ g} 44 \xrightarrow{f \circ g} 88$$

(c)

$$g \circ f(n) = g(f(n)) \Rightarrow 9 \xrightarrow{g} 11 \xrightarrow{f} 22 \xrightarrow{g} 44 \xrightarrow{f} 88$$

$$n \leq 100 \mapsto n - 100 \leq 0$$

$$n(n-1) \leq 0$$

$$\hookrightarrow 0 \leq n \leq 1$$

$$+1 \quad +1$$

$$\hookrightarrow (0, 1, 2)$$

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$$\frac{n^p - p}{n} \xrightarrow{\text{تكملة}} n - \frac{p}{n} \xrightarrow{\text{تربيع}} (n - \frac{p}{n})^2 = n^2 + \frac{p^2}{n^2} - \frac{2p}{n} \quad (v)$$

$$n^2 + n - \frac{p}{n} + \frac{p^2}{n^2} \leftarrow (n^2 - \frac{p^2}{n^2}) \text{ قابل تقسيم على } n^2 \leftarrow$$

$$\Rightarrow n - \frac{p}{n} = t \Rightarrow f(t) = t^p + t$$

$$\Rightarrow f(n) = n^p + n$$

$$f(g(n)) \rightarrow A(D_{f \circ g}) : \log_p \quad (1)$$

$$\left. \begin{array}{l} 1/n - n^p \\ \downarrow \\ B(R_{f \circ g}) \Rightarrow \log_p \end{array} \right\} \begin{array}{l} \frac{-b}{2a} = \frac{-1}{-2} = \frac{1}{2} \\ \downarrow \\ \log_p \left(\frac{1}{2} \right) = p \end{array}$$

$$\begin{array}{l} \hookrightarrow 1/n - n^p > 0 \\ -n^p + 1/n > 0 \\ -n(n - 1) > 0 \\ \frac{0}{-1+1} \end{array}$$

$$R_{f \circ g} = (-\infty, F]$$

$$B = R_{f \circ g} : (0, 1]$$

$$A \cap B = (0, 1] \rightarrow \text{مجموعة } F$$

$$f(f(n)) = 1 - \frac{1}{n} f'(n)$$

$$f(n) = t \Rightarrow f(t) = 1 - \frac{1}{t} t^p \Rightarrow f(n) = 1 - \frac{1}{n^p}$$

$$\begin{aligned} h(g(n)) &= (n-1)^p + p(n-1) + 1 \\ &= n^p - \frac{p}{n} n^p + \frac{p}{n} n - \frac{p}{n} + \frac{p}{n} n - \frac{p}{n} + 1 \\ &= n^p - \frac{p}{n} n^p + \frac{p}{n} n - \frac{p}{n} \end{aligned}$$

$$\begin{array}{l} \Rightarrow n^p - \frac{p}{n} n^p + \frac{p}{n} n - \frac{p}{n} = 1 - \frac{1}{n^p} \\ n^p + \frac{p}{n} n - \frac{p}{n} = \end{array}$$

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$$g(f(u)) = au^p + \gamma u$$

$$u = \frac{\epsilon}{n}$$

$$\Rightarrow g(u - \frac{\epsilon}{n}) = au^p + \gamma u$$

$$(g(u) = 1)$$

$$u - \frac{\epsilon}{n} = u \Rightarrow u^p - u^p u - \epsilon = 0$$

$$u = -1, \gamma$$

$$\} \rightarrow au^p + \gamma u = 1$$

$$u = -1 \rightarrow a - \gamma = 1$$

$$a = 1 \Rightarrow a = -1$$

$$u = \epsilon \rightarrow \gamma \epsilon a + 1 = 1$$

$$\Rightarrow a = 1$$

(1)