

بالترتيب من اليمين

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تكاليف حسابية

$$f(f(r))$$

$$f \circ f(r)$$

$$f(x) = \begin{cases} \cot \frac{\pi x}{4} & ; x \leq 1 \\ \sqrt{x+1} & ; x > 1 \end{cases} \quad \text{① دالة}$$

$$\cot \frac{\pi}{4} \times \frac{1}{r} = \cot \left(\frac{\pi}{4} \right) = \sqrt{3}$$

$$f(\sqrt{3}) = \sqrt{3+1} = 2 \quad \text{②}$$

$$f\left(\frac{1}{x}\right) = \sqrt{\frac{1}{x}-1}$$

$$f\left(\frac{1}{r}\right)$$

$$x=r \rightarrow f\left(\frac{1}{r}\right) = \sqrt{\frac{r}{r}-1}$$

$$g(x) = r \cos^2 x$$

$$f \circ g\left(\frac{\pi}{2}\right) = ?$$

$$\text{الف ②}$$

$$f(g(\frac{\pi}{2})) = f(r \cos^2(\frac{\pi}{2})) = r \cos^2(\frac{\pi}{2}) = r \times \frac{1}{2} = \frac{r}{2}$$

$$f(x) = [x]$$

$$g(x) = \frac{x}{1-x}$$

$$f \circ g(\sqrt{2}) = ?$$

$$f(g(\sqrt{2}))$$

$$\frac{\sqrt{2}}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{1-\sqrt{2}}{\sqrt{2}+2} = -2-\sqrt{2}$$

$$f(-2-\sqrt{2}) = -2$$

$$f(x) = \sin x$$

$$g(x) = x \sqrt{1-x^2}$$

$$g \circ f\left(\frac{\pi}{2}\right) = ?$$

$$\text{③}$$

$$g(f(\frac{\pi}{2})) =$$

$$\sin \frac{\pi}{2} \cdot \frac{\sqrt{2}}{2}$$

$$g(\frac{\sqrt{2}}{2}) =$$

$$\frac{\sqrt{2}}{2} \sqrt{1-\frac{1}{2}} = \frac{\sqrt{2}}{2} \times \frac{1}{\sqrt{2}} = \frac{1}{2}$$

$$\left(\frac{1}{2}\right)$$

s.a.m

$$f(x) = \{(x, a), (y, a), (z, a), (w, a)\}$$

$$g(x) = \{(x, y), (y, z), (z, w), (w, a)\}$$

$$\text{a) } f(g(x)) = \{(x, y), (y, z), (z, w), (w, a)\} \quad \text{b) } g(f(x)) = \{(x, a), (y, a), (z, a), (w, a)\}$$

$$\text{c) } f \circ f = f(f(x)) \quad \text{d) } g \circ g = g(g(x))$$

$$f = \{(x, y), (y, z), (z, w), (w, a)\}$$

$$g = \{(x, y), (y, z), (z, w), (w, a)\}$$

$$f \circ g = f(g(x))$$

$$x \rightarrow y \rightarrow z$$

$$y \rightarrow z \rightarrow w$$

$$z \rightarrow w \rightarrow a$$

$$a = x$$

$$\text{b) } \text{a} = x$$

$$(x, y) \in f \circ g \quad (a, b)$$

$$(x, y) \in g \circ f$$

$$g \circ f = g(f(x))$$

$$x \rightarrow y \rightarrow z$$

$$y \rightarrow z \rightarrow w$$

$$z \rightarrow w \rightarrow a$$

$$b = a, a = x$$

$$(a, b) = (x, a)$$

s.a.m

$$f(f(x)) = rx + r$$

$$g \circ f(-1)?$$

$$g(rx + r) = rx - r$$

$$f(x) = ax + b$$

$$g(x) = mx + n$$

$$a^2 = r \rightarrow a = \pm r$$

$$\begin{cases} a = r \rightarrow b = 1 \\ a = -r \rightarrow b = -r \end{cases} \quad (4)$$

$$f(f(x)) = f(ax + b) = a(ax + b) + b = arx + ab + b = rx + r$$

$$g(rx + r) = m(rx + r) + n = rmx + rm + n = rx - r$$

$$rm = r$$

$$m = r$$

$$rm + n = r$$

$$n = -r$$

$$n = -\frac{r}{r}$$

$$f(x) = \begin{cases} rx + 1 \\ -rx - r \end{cases}$$

$$g(x) = \begin{cases} rx - \frac{1}{r} \\ -rx - \frac{1}{r} \end{cases}$$

$$f(-1) = -1$$

$$f(-1) = -1$$

$$g(-1) = -\frac{r}{r} - \frac{1}{r} = -1 - \frac{1}{r} = -\frac{r+1}{r} = -\frac{1}{r} \quad (5)$$

$$f(x) = \sqrt{x + |x|}$$

$$g(x) = \frac{1}{x^2 - 2x}$$

$$Dg \circ f?$$

$$(1)$$

$$x \in Df, f(x) \in Dg$$

$$Dg(f(x))$$

$$x + |x| \geq 0 \Rightarrow \begin{cases} + \\ 0 \end{cases} \checkmark \rightarrow \mathbb{R}$$

$$Dg = x^2 - 2x \neq 0 \Rightarrow x^2 \neq 2x \rightarrow x \neq 0, 2$$

$$\sqrt{x + |x|} \neq 0 \rightarrow x \notin \mathbb{R}^-, 0$$

$$Dg \circ f: (0, 2 + \infty) - \{1\}$$

$$\sqrt{x + |x|} \neq 1 \rightarrow x + |x| \neq 1 \rightarrow x \neq 1$$

$$f(x) = \sqrt{1 - x^2}$$

$$g(x) = \sqrt{x}$$

$$D(f+g) \subseteq D$$

$$[0, 1] \quad (1)$$

$$Df \Rightarrow 1 - x^2 \geq 0$$

$$x^2 \leq 1 \rightarrow -1 \leq x \leq 1$$

$$[-1, 1]$$

$$Dg \Rightarrow [0, 2 + \infty)$$

$$Dg \circ f = Df \cap Dg = [0, 1]$$

$$D(f+g) \subseteq D$$

$$x \in Df, x \in [-1, 1]$$

$$f(f(x)) + g(f(x))$$

$$f(x) \in Df \rightarrow -1 \leq \sqrt{1 - x^2} \leq 1$$

$$1 \leq x^2 \leq 1 \rightarrow x^2 \geq 0 \checkmark \mathbb{R}$$

$$f(x) \in Dg \checkmark$$

$$\sqrt{1 - x^2} \geq 0 \checkmark$$

s.a.m

$$\text{جاء } f\left(\frac{r+1}{n-r}\right) = r+1$$

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

$$\frac{r+1}{n-r} = t \rightarrow t(n-r) = r+1$$

$$(t-r)n = 1+r \rightarrow n = \frac{1+r}{t-r}$$

$$\text{ب) } f\left(n + \frac{1}{n}\right) = \frac{n^2+1}{n^2}$$

$$n + \frac{1}{n} = t$$

$$\rightarrow t^2 - rt$$

$$\left(n + \frac{1}{n}\right)^2 = n^2 + \frac{1}{n^2} + 2\left(n + \frac{1}{n}\right) =$$

$$t^2 - rt = n^2 + \frac{1}{n^2} + 2t$$

$$f(t) = t^2 - rt \rightarrow f(n) = n^2 - rn$$

$$f(x) = x\sqrt{x}$$

$$g \circ f(x)$$

$$g \circ f(x) = 1, 2\sqrt{x}$$

$$g(f(x)) = 0 \rightarrow f(x) = 1, 2\sqrt{x}$$

$$x\sqrt{x} = 1 \rightarrow x = 1$$

$$x\sqrt{x} = 2\sqrt{x} \rightarrow x = 2 \quad \text{النتيجة} = 1$$

s.a.m