

$$f\left(f\left(\frac{1}{\sqrt{3}}\right)\right) \rightarrow \frac{1}{\sqrt{3}} < 1 \rightarrow \cos \frac{1\pi}{12} = \frac{\pi}{4} \rightarrow \left(\frac{\sqrt{3}}{2}\right)$$

$$\sqrt{\left(\frac{\sqrt{3}}{2}\right)^2 + 1} = 2 \text{ ماض}$$

$$\text{الف) } f(g(n)) \rightarrow f\left(g\left(\frac{\pi}{4}\right)\right) \rightarrow g\left(\frac{\pi}{4}\right) = 2\cos^2 \frac{\pi}{4} \rightarrow 2 \times \frac{1}{2} = 1 \rightarrow f\left(\frac{1}{2}\right) \Rightarrow$$

$$\sqrt{\frac{2 \times 2 - 1}{2}} = \sqrt{\frac{3}{2}} = \left(\frac{\sqrt{6}}{2}\right) \text{ ماض}$$

$$\frac{1}{n} = \frac{1}{2} \Rightarrow n = 2$$

$$\text{ب) } f(g(\sqrt{2})) \Rightarrow g(\sqrt{2}) = \frac{\sqrt{2}}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{2+\sqrt{2}}{-1} \Rightarrow -2-\sqrt{2} \rightarrow f(-2-\sqrt{2}) = \left[-2-\sqrt{2}\right]$$

$$\left[-2-\sqrt{2}\right] = \left[-\frac{4}{2}-\frac{\sqrt{2}}{2}\right] = \left[-\frac{4+\sqrt{2}}{2}\right] \text{ ماض}$$

$$g(f(n)) \Rightarrow f\left(\frac{\pi}{2}\right) = \sin \frac{\pi}{2} = \frac{\sqrt{2}}{2}$$

$$g\left(\frac{\sqrt{2}}{2}\right) \Rightarrow \frac{\sqrt{2}}{2} \sqrt{1-\left(\frac{\sqrt{2}}{2}\right)^2} = \frac{\sqrt{2}}{2} \sqrt{1-\frac{1}{2}} = \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \left(\frac{1}{2}\right) \text{ ماض}$$

$$\text{الف) } f(g(n)) = \begin{cases} \varepsilon \rightarrow \omega \\ 1 \rightarrow \varepsilon \\ 4 \rightarrow 1 \\ 10 \rightarrow 12 \end{cases} \Rightarrow f(g(n)) = \{(\varepsilon, \omega), (1, \omega), (4, 12), (10, 12)\}$$

$$\text{ب) } g(f(n)) = \begin{cases} \varepsilon \rightarrow \omega \\ 1 \rightarrow \varepsilon \\ 4 \rightarrow 1 \\ 10 \rightarrow 12 \end{cases} \Rightarrow g(f(n)) = \{(\varepsilon, \omega), (1, \omega), (4, 1), (10, 12)\}$$

$$\text{د) } g(g(n)) = \begin{cases} \varepsilon \rightarrow 1 \\ 1 \rightarrow \varepsilon \\ 4 \rightarrow 1 \\ 10 \rightarrow 12 \end{cases} \Rightarrow g(g(n)) = \{(\varepsilon, 1), (1, \varepsilon), (4, 1), (10, 12)\}$$

$$f(g(n)) \rightarrow g\left\{\begin{matrix} \varepsilon \\ 1 \end{matrix}\right\} \rightarrow 2 \Rightarrow z = 3 \text{ ماض}$$

$$g(f(n)) \rightarrow \begin{cases} \varepsilon \rightarrow \omega \\ 1 \rightarrow \varepsilon \end{cases} \rightarrow b = \omega \quad (a, b) = (1, \omega)$$

$$f(x) = ax + b \rightarrow a(ax + b) + b = a^2x + ab + b = \varepsilon x + 1 \rightarrow \begin{cases} a = r - r^2b + b = r - 1 \\ a = r - 1 - r^2b + b = r - 1 \end{cases}$$

$$g(x) = a'x + b' \rightarrow a'(rx + r) + b' = rx - r$$

$$ra'x + \frac{ra' + b'}{r} = rx - r \rightarrow ra' = r - 1 \rightarrow a' = \frac{r-1}{r}, b' = -\frac{1-r}{r}$$

$$b' = -\frac{1-r}{r} \rightarrow \frac{1-r}{r} + b' = r \rightarrow \varepsilon x + b' = r \rightarrow b' = -\frac{1-r}{r}$$

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

$$f(x) \rightarrow \begin{cases} rx + 1 \rightarrow r(rx + 1) + 1 = \varepsilon x + r \\ -rx - r \rightarrow -r(-rx - r) - r = \varepsilon x + r \end{cases} \Rightarrow \begin{cases} g(f(-1)) = \frac{r-1}{r}(-1) - \frac{1-r}{r} = -\frac{r-1}{r} = -1 \\ g(f(-1)) = \frac{r-1}{r}(-1) - \frac{1-r}{r} = -\frac{r-1}{r} = -1 \end{cases}$$

$$g(x) = \frac{1}{x(x-1)} \Rightarrow \frac{1}{x(x-1)} = 0$$

$$\frac{1}{\sqrt{x+1}(\sqrt{x+1}-1)} \rightarrow \sqrt{x+1} = \varepsilon \rightarrow x+1 = 1 \rightarrow x = 0$$

$$\sqrt{x+1} > 0 \rightarrow x+1 > 0 \rightarrow R^+ \Rightarrow (0, +\infty) - \{1\} \Rightarrow R^+ - \{1\}$$

$$f(f(x)) + g(f(x)) = \frac{1-x^2}{1+x^2} \rightarrow \frac{1-x^2}{1+x^2} = 0$$

$$\{x \in D_f, f(x) \in D_{f+g}\} \Rightarrow \{-1 \leq x \leq 1, \sqrt{1-x^2} \leq 1\} \Rightarrow [-1, 1]$$

$$\frac{rx+1}{x-1} = t \rightarrow x = -\frac{rt-1}{t-1} \rightarrow \frac{rt+1}{t-1} \Rightarrow \varepsilon \left(\frac{rt+1}{t-1} \right) + \omega \rightarrow \varepsilon \left(\frac{rt+1}{x-1} \right) + \omega$$

$$\frac{12x + \varepsilon + \omega x - 10}{x-1} = \frac{12x - 11}{x-1}$$

$$x + \frac{1}{x} = t \quad \left(x + \frac{1}{x}\right)^r = x^r + \frac{1}{x^r} + r \left(x + \frac{1}{x}\right) \Rightarrow t^r = x^r + \frac{1}{x^r} + rt$$

$$f(t) = t^r - rt \rightarrow f(x) = x^r - \frac{1}{x^r}$$

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

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

$$r-1 = 1 \Rightarrow r = 2$$