

$f(u) = au + b \Rightarrow f(f(u)) \Rightarrow a(au+b) + b \Rightarrow a^2u + ab + b = \{u + 3\} \Rightarrow a = 2 \quad b = 1 \quad \frac{1}{a} = \frac{1}{2} \quad b = -3 \Rightarrow \text{ن/ص ٤}$ $g(u+3) = 4u-2 \Rightarrow 4u+3 = t \Rightarrow 4u = t-3 \Rightarrow u = \frac{t-3}{4} \Rightarrow g(u) = 3\left(\frac{u-3}{4}\right) - 2$ $\Rightarrow \frac{3u-9-8}{4} \Rightarrow g(u) = \frac{3u-17}{4} \Rightarrow u = -1 \Rightarrow f(-1) = 2(-1) + 1 = -1 \Rightarrow g(-1) = \boxed{-1}$ $\Rightarrow g \circ f(-1) = -1$	٤
$f(u) = \sqrt{u+1} \quad , \quad g(u) = \frac{1}{u^2-5u} \Rightarrow g \circ f(u) = \frac{1}{(\sqrt{u+1})^2 - 5\sqrt{u+1}}$ $\Rightarrow \frac{1}{u+1-5\sqrt{u+1}} \Rightarrow \frac{1}{\sqrt{u+1} + 5\sqrt{u+1}} \Rightarrow \frac{1}{6\sqrt{u+1}} \Rightarrow u \leq 0 \Rightarrow 0 \Rightarrow D_{g \circ f} = (0, +\infty) - \{1\}$ $D_{g \circ f} = \{u \in D_f \mid f(u) \in D_g\} \Rightarrow \sqrt{u+1} \Rightarrow D_f = \mathbb{R}$ $g(u) = \frac{1}{u^2-5u} \Rightarrow D_g = \mathbb{R} - \{0, 5\} \Rightarrow \sqrt{u+1} \neq 0 \Rightarrow u \neq -1 \quad \sqrt{u+1} \neq 5 \Rightarrow u+1 \neq 25 \Rightarrow u \neq 24$ $\Rightarrow D = (0, +\infty) - \{1, 24\}$	٧
$g(u) = \sqrt{u} \Rightarrow D_g = [0, +\infty) \quad , \quad f(u) = \sqrt{1-u^2} \Rightarrow 1-u^2 \geq 0 \Rightarrow -1 \leq u \leq 1$ $D_{f+g} \Rightarrow D_f \cap D_g \Rightarrow [0, 1] \Rightarrow D_{(f+g) \circ f} = \{u \in D_f \mid f(u) \in D_{f+g}\}$ $\Rightarrow \{u \in [-1, 1] \mid 0 \leq \sqrt{1-u^2} \leq 1\} \Rightarrow 0 \leq 1-u^2 \leq 1 \Rightarrow u=0 \quad u=1 \quad u=-1$ $\Rightarrow -1 \leq -u^2 \leq 0 \Rightarrow 1 \leq u^2 \leq 2 \Rightarrow u^2 = [0, 1] \Rightarrow u = [0, 1]$ $D(f+g) \circ f = [0, 1]$	٨
$١) f\left(\frac{u+1}{u-2}\right) \Rightarrow \xi u + \omega \Rightarrow \frac{u+1}{u-2} = t \Rightarrow tu - 2t = u + 1 \Rightarrow tu - u = 1 + 2t \Rightarrow u(t-2) = 1+2t \Rightarrow u = \frac{1+2t}{t-2}$ $\Rightarrow u = \frac{1+2t}{t-2} \Rightarrow f(t) = \xi\left(\frac{1+2t}{t-2}\right) + \omega = f(u) = \frac{1^2 u - 1}{u-2}$ $٢) f\left(u + \frac{1}{u}\right) = u^2 + \frac{1}{u^2} \Rightarrow u + \frac{1}{u} = t \Rightarrow \left(u + \frac{1}{u}\right)\left(u^2 + \frac{1}{u^2} - 1\right) = u^2 + \frac{1}{u^2}$ $\Rightarrow \left(u + \frac{1}{u}\right)\left(u^2 + \frac{1}{u^2} - 1\right) = u^2 + \frac{1}{u^2} \Rightarrow f(t) = t(t^2 - 1) \Rightarrow f(u) = u(u^2 - 1)$	٩
$g(u) = 0 \Rightarrow u = 1 \quad \& \quad u = \sqrt[3]{2} \quad , \quad g(f(u)) = 0 \Rightarrow u\sqrt{u} = 1 \Rightarrow u = 1$ $u\sqrt{u} = 1 \Rightarrow u = 1 \Rightarrow \boxed{1-1=0}$	١٠