

1. $D_{g \circ f} = \{u \mid u \in D_f \cap \{u \mid f(u) \in D_g\}\}$ $D_f: \begin{cases} u-1 > 0 \Rightarrow u > 1 \\ \log_r^{u-1} \geq 0 \Rightarrow u-1 \geq 1 \Rightarrow u \geq 2 \end{cases} \Rightarrow u \geq 2$

9. $\sqrt{-(u-1)^2}$ $D_g = \{u \mid -(u-1)^2 \geq 0\} \Rightarrow D_g = \{1\} \Rightarrow f(u) = 1 \Rightarrow \sqrt{\log_r^{u-1}} = 1 \Rightarrow \log_r^{u-1} = 1 \Rightarrow u-1 = r^1 \Rightarrow u = 1+r$

2. $f \circ g(u) = f(g(u)) = f(u^2 - 2u + 1) = (u^2 - 2u + 1)^2 - 4(u^2 - 2u + 1) + 1 = u^4 - 4u^3 + 6u^2 - 4u + 1$

$g \circ f(u) = g(f(u)) = g(u^2 - 2u + 1) = (u^2 - 2u + 1)^2 - 4(u^2 - 2u + 1) + 1 = u^4 - 4u^3 + 6u^2 - 4u + 1$

$f \circ g(u) = g \circ f(u) = u^4 - 4u^3 + 6u^2 - 4u + 1 \Rightarrow u^4 - 4u^3 + 6u^2 - 4u + 1 = 0$ $\Rightarrow u^4 - 4u^3 + 6u^2 - 4u + 1 = 0$ $\Rightarrow (u-1)^4 = 0 \Rightarrow u = 1$

3. $g(f(u)) = \omega u^2 + 11 \Rightarrow g(\frac{u}{t}) = \omega (\frac{u}{t})^2 + 11 \Rightarrow g(t) = \omega (\frac{t}{t})^2 + 11 \Rightarrow g(t) = \omega + 11$

$g(u) = \frac{\omega u^2}{t} + 11 \Rightarrow g(u-v) = \frac{\omega (u-v)^2}{t} + 11 = \frac{\omega u^2}{t} + \frac{\omega (-1)^2 u}{t} + \frac{\omega (-1)^2}{t} + 11$ $\Rightarrow \frac{\omega u^2}{t} + \frac{\omega u}{t} + \frac{\omega}{t} + 11$

$g(v) = \frac{\omega (v-v)^2}{t} + 11 = 11$

4. $f(g(u)) = f(g(u)) - f = (u^2 - 2u + 1) - f = g(u) - \frac{u^2 - 2u + 1}{f} + f \Rightarrow g(u) = u^2 - 2u + 1 = (u-1)^2$

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

5. $f - g(u) = -u + \omega$ $f(g(u)) = f(g(u)) - 12 \Rightarrow g(u) = \frac{f}{f} f(u) - v$ $f - g = f - \frac{f}{f} f + v = -\frac{1}{f} f(u) + v = -u + \omega$

$f(u) = \frac{-u + \omega - v}{(-\frac{1}{f})} = ru + f$ $g(u) = \frac{f}{f} (ru + f) - v = ru - 1 \Rightarrow f \circ g(u) = f(ru - 1) = f = ru + f$

6. $f \circ g(u) = q \log_r^u = u \log_r^q = u^2$ $g \circ f(u) = \log_r^{qu} = u \log_r^q = ru$ $f \circ g(u) \leq g \circ f(u) \Rightarrow u^2 \leq ru \Rightarrow u(u-r) \leq 0 \Rightarrow u \in [0, r]$

7. $f(u - \frac{r}{u}) = u - \frac{r}{u} + u^2 + \frac{f}{u^2} - f \Rightarrow f(u) = u^2 + u$

8. $f \circ g = \log_r^{u-u^2}$ $D_{f \circ g} = \{u \mid u-u^2 > 0\} \Rightarrow u(1-u) > 0 \Rightarrow u \in (0, 1)$

$\rightarrow \log_r^{(1-f)} = 14 \Rightarrow R: (-\infty, 14] \xrightarrow{\log_r^{(1-f)}} \log_r^{(1-f)} \Rightarrow (0, f] \Rightarrow [1, 2, 3, f] \Rightarrow$

9. $f(f(u)) = 1 - f(u) \Rightarrow f(u) = 1 - f(u)$ $h(g(u)) = (u-1)^2 + f(u-1) + 1 = u^2 - 2u + 1 + f(u-1) + 1 = u^2 - 2u + 2 + f(u-1)$

$h(g(u)) = f(u) \Rightarrow u^2 - 2u + 2 + f(u-1) = f(u) \Rightarrow u^2 - 2u + 2 = 0$

10. $g(f(u)) = \alpha u^2 + ru = \lambda$ $u - \frac{f}{u} + r \Rightarrow u^2 - f + ru = 0 \Rightarrow (u-f)(u+1) = 0 \Rightarrow u = f$

$u = f \Rightarrow g(f) = 4fa + 1 = \lambda \Rightarrow a = 0$

$u = -1 \Rightarrow g(f) = -a - r = \lambda \Rightarrow a = -1$