

2.10 1)

$$\begin{aligned}
 (f \circ g)(x) &= (g \circ f)(x) \Rightarrow f(g(x)) = g(f(x)) \Rightarrow 2g(x) + 3 = -f(x) + \alpha \Rightarrow \\
 &\Rightarrow 2(-x + \alpha) + 3 = -(2x + 3) + \alpha \Rightarrow \cancel{2x} + 2\alpha + 3 = \cancel{2x} - 3 + \alpha \Rightarrow \boxed{\alpha = -6}
 \end{aligned}$$

2.10 2)

$$\begin{aligned}
 (f \circ g)(x) &= (g \circ f)(x) \Rightarrow f(g(x)) = g(f(x)) \Rightarrow 4g(x) - 1 = 7f(x) + \alpha \Rightarrow \\
 &\Rightarrow 4(7x + \alpha) - 1 = 7(4x - 1) + \alpha \Rightarrow \cancel{28x} + 4\alpha - 1 = \cancel{28x} - 7 + \alpha \Rightarrow \\
 &\Rightarrow 3\alpha = -6 \Rightarrow \boxed{\alpha = -2}
 \end{aligned}$$

2.10 3)

$$(f \circ f)(x) = x - 8 \Rightarrow f(f(x)) = x - 8 \Rightarrow \alpha f(x) + \beta = x - 8 \Rightarrow \alpha(\alpha x + \beta) + \beta = x - 8$$

$$\Rightarrow \alpha^2 x + \alpha\beta + \beta = x - 8 \Rightarrow \begin{cases} \nearrow \alpha^2 = 1 \\ \searrow \alpha\beta + \beta = -8 \end{cases} \Rightarrow$$

$$\left\{ \begin{array}{l} \alpha = 1 \\ 1 \cdot \beta + \beta = -8 \end{array} \right. \Rightarrow \quad \quad \quad \text{ή} \quad \quad \quad \left\{ \begin{array}{l} \alpha = -1 \\ -1 \cdot \beta + \beta = -8 \Rightarrow 0 \cdot \beta = -8 \end{array} \right. \quad \text{αδύνατο}$$

$$\Rightarrow \boxed{\begin{array}{l} \alpha = 1 \\ \beta = -4 \end{array}}$$