

$$1. f(x) = \frac{1}{x} \quad f^{-1}(x) = g(x) \quad g'(3) = ?$$

$$g: (3, \frac{1}{3}) \quad f: (\frac{1}{3}, 3) \quad f(x) = \frac{1}{x} = 3 \rightarrow x = \frac{1}{3}$$

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

$$g'(3) = \frac{1}{f'(\frac{1}{3})}$$

$$f'(\frac{1}{3}) = -\frac{1}{(\frac{1}{3})^2} = -\frac{1}{\frac{1}{9}} = -9$$

$$= \boxed{-\frac{1}{9}}$$

$$2. g(x) = 2x + 3 \quad h(x) = g^{-1}(x) \quad h'(-5) = ?$$

$$h: (-5, -4) \quad g: (-4, -5) \quad \begin{array}{l} 2x + 3 = -5 \\ x = -4 \end{array}$$

$$h'(-5) = \frac{1}{g'(-4)}$$

$$g'(x) = 2$$

$$g'(-4) = 2$$

$$= \boxed{\frac{1}{2}}$$

$$3. f(x) = 3 + e^{3x} \quad f^{-1}(x) = g(x) \quad f: (0, 4) \quad g: (4, 0)$$

$$f'(x) = 3e^{3x} \quad g'(4) = \frac{1}{f'(0)} = \boxed{\frac{1}{3}}$$

$$f'(0) = 3$$

$$4. f(x) = 4 + e^{4x} \quad f^{-1}(x) = g(x) \quad f: (0, 5) \quad g: (5, 0)$$

$$f'(x) = 4e^{4x}$$

$$f'(0) = 4$$

$$g'(5) = \frac{1}{f'(0)} = \boxed{\frac{1}{4}}$$