

$$\blacksquare f : \mathbb{R}^2 \rightarrow \mathbb{R}^2$$

$$\blacksquare f(x, y) = (x + 1, 2y - e^x)$$

$$\blacksquare g : \mathbb{R}^2 \rightarrow \mathbb{R} \in C^1$$

$$\blacksquare P_2(x, y) \deg \circ f \text{ en } (0, 0)$$

$$\blacksquare P_2(x, y) = 4 + 3x - 2y - x^2 + 5xy$$

$$\blacksquare \nabla g(1, -1)$$

$$h = g \circ f = g(f(x, y)) = g(x + 1, 2y - e^x)$$

$$h(0, 0) = g(f(0, 0)) \stackrel{f(0, 0) = (1, -1)}{=} g(1, -1)$$

$$\blacksquare h_x(0, 0) = P_{2x}(0, 0)$$

$$P_{2x}(x, y) = 3 - 2x + 5y \Rightarrow P_{2x}(0, 0) = 3$$

$$\blacksquare h_y(0, 0) = P_{2y}(0, 0)$$

$$P_{2y}(x, y) = -2 + 5y \Rightarrow P_{2y}(0, 0) = -2$$

$$h_x(0, 0) = g_x(1, -1) \cdot 1 + g_y(1, -1) \cdot (-1)$$

$$h_y(0, 0) = g_x(1, -1) \cdot 0 + g_y(1, -1) \cdot 2$$

$$h_y(0, 0) = -2 = 2g_y(1, -1) \Rightarrow g_y(1, -1) = -1$$

$$h_x(0, 0) = 3 = g_x(1, -1) + 1 \Rightarrow g_x(1, -1) = 2$$

$$\Rightarrow \nabla g(1, -1) = (2, -1)$$