3.

$\otimes$

$f: \mathbb{R}^n \to \mathbb{R}^n \qquad f(x_1, x_2, \ldots, x_n)$

$= (x_n, x_{n-1}, \ldots, x_2, x_1)$

$g: \mathbb{R}^n \to \mathbb{R}^n$

$$f'(x) = \begin{bmatrix} 0 & 0 & \cdots & 0 & 1 \\ 0 & 0 & & 1 & 0 \\ 0 & 0 & & 0 & 0 \\ \vdots & \vdots & & \vdots & \vdots \\ 0 & 1 & \cdots & 0 & 0 \\ 1 & 0 & \cdots & 0 & 0 \end{bmatrix}$$

$$g'(x) = \begin{bmatrix} \frac{\partial g_1}{\partial x_1}(x) & \frac{\partial g_1}{\partial x_2}(x) & \cdots & \frac{\partial g_1}{\partial x_n}(x) \\ \frac{\partial g_2}{\partial x_1}(x) & \frac{\partial g_2}{\partial x_2}(x) & \cdots & \frac{\partial g_2}{\partial x_n}(x) \\ \vdots & \vdots & & \vdots \\ \frac{\partial g_n}{\partial x_1}(x) & \frac{\partial g_n}{\partial x_2}(x) & \cdots & \frac{\partial g_n}{\partial x_n}(x) \end{bmatrix}$$

$(f \circ g)'(x) = f'(g(x)) \cdot g'(x) =$

$$
= \begin{bmatrix}
\frac{\partial g_n}{\partial x_1}(x) & \frac{\partial g_n}{\partial x_2}(x) & \cdots & \frac{\partial g_n}{\partial x_n}(x) \\
\vdots & \vdots & & \vdots \\
\frac{\partial g_2}{\partial x_1}(x) & \frac{\partial g_2}{\partial x_2}(x) & \cdots & \frac{\partial g_2}{\partial x_n}(x) \\
\frac{\partial g_1}{\partial x_1}(x) & \frac{\partial g_1}{\partial x_2}(x) & \cdots & \frac{\partial g_1}{\partial x_n}(x)
\end{bmatrix}
$$

$$
\frac{\partial (f\circ g)_i}{\partial x_j}(x) = [\text{i-ti redak, j-ti stupac gornje matrice}] =
$$

$$
= \frac{\partial g_{(n+1-i)}}{\partial x_j}(x)
$$

$$
\boxed{\frac{\partial (f\circ g)_i}{\partial x_j} = \frac{\partial g_{(n+1-i)}}{\partial x_j}}
$$

$$(g \circ f)'(x) = g'(f(x)) \cdot f'(x) =$$

$$= \begin{bmatrix} \frac{\partial g_1}{\partial x_1}(f(x)) & \frac{\partial g_1}{\partial x_2}(f(x)) & \cdots & \frac{\partial g_1}{\partial x_n}(f(x)) \\ \frac{\partial g_2}{\partial x_1}(f(x)) & \frac{\partial g_2}{\partial x_2}(f(x)) & \cdots & \frac{\partial g_2}{\partial x_n}(f(x)) \\ \vdots & \vdots & & \vdots \\ \frac{\partial g_n}{\partial x_1}(f(x)) & \frac{\partial g_n}{\partial x_2}(f(x)) & \cdots & \frac{\partial g_n}{\partial x_n}(f(x)) \end{bmatrix}$$

$$\cdot \begin{bmatrix} 0 & 0 & \cdots & 0 & 1 \\ 0 & 0 & & 1 & 0 \\ 0 & 0 & & 0 & 0 \\ \vdots & \vdots & & \vdots & \vdots \\ 0 & 1 & \cdots & 0 & 0 \\ 1 & 0 & \cdots & 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{\partial g_1}{\partial x_n}(f(x)) & \frac{\partial g_1}{\partial x_{n-1}}(f(x)) & \cdots & \frac{\partial g_1}{\partial x_1}(f(x)) \\ \frac{\partial g_2}{\partial x_n}(f(x)) & \frac{\partial g_2}{\partial x_{n-1}}(f(x)) & \cdots & \frac{\partial g_2}{\partial x_1}(f(x)) \\ \vdots & & & \\ \frac{\partial g_n}{\partial x_n}(f(x)) & \frac{\partial g_n}{\partial x_{n-1}}(f(x)) & \cdots & \frac{\partial g_n}{\partial x_1}(f(x)) \end{bmatrix}$$

$$\frac{\partial (g \circ f)_i}{\partial x_j}(x) = [\text{i-ti redak, j-ti stupac prethodne matrice}]$$

$$= \frac{\partial g_i}{\partial x_{(n+1-j)}}(f(x))$$