DERIVATOR I FLERA DIMENSIONER

$\boxed{f : \mathbb{R}^n \longrightarrow \mathbb{R}}$

$\bar{x} \in \mathbb{R}^n$, $\bar{x} = (x_1, \dots, x_n)$

$$Df(\bar{x}) = \left(\frac{\partial f}{\partial x_1}(\bar{x}), \dots, \frac{\partial f}{\partial x_n}(\bar{x}) \right) = \nabla f(\bar{x})$$

(RADVEKTOR 1xn MATRIS)

$\boxed{\bar{f} : \mathbb{R} \longrightarrow \mathbb{R}^m}$

$x \in \mathbb{R}$, $\bar{f}(x) = \begin{pmatrix} f_1(x) \\ \vdots \\ f_m(x) \end{pmatrix}$

$$D\bar{f}(x) = \begin{pmatrix} f_1'(x) \\ \vdots \\ f_m'(x) \end{pmatrix} = \bar{f}'(x)$$

(KOLONNVEKTOR mx1 MATRIS)

$\boxed{\bar{f} : \mathbb{R}^n \longrightarrow \mathbb{R}^m}$

$\bar{x} \in \mathbb{R}^n$, $\bar{f}(\bar{x}) = \begin{pmatrix} f_1(\bar{x}) \\ \vdots \\ f_m(\bar{x}) \end{pmatrix}$

$$D\bar{f}(\bar{x}) = \begin{pmatrix} \frac{\partial f_1}{\partial x_1}(\bar{x}) & \cdots & \frac{\partial f_1}{\partial x_n}(\bar{x}) \\ \vdots & \ddots & \vdots \\ \frac{\partial f_m}{\partial x_1}(\bar{x}) & \cdots & \frac{\partial f_m}{\partial x_n}(\bar{x}) \end{pmatrix}$$

(mxn MATRIS)

KEDJEREGELN:

$$\begin{cases} \bar{f} : \mathbb{R}^k \longrightarrow \mathbb{R}^m \\ \bar{g} : \mathbb{R}^n \longrightarrow \mathbb{R}^k \end{cases}$$

$$\boxed{D\left(\bar{f}(\bar{g}(\bar{x}))\right) = D\bar{f}(\bar{g}(\bar{x})) \cdot D\bar{g}(\bar{x})}$$

EX

$f : \mathbb{R}^n \longrightarrow \mathbb{R}$

$\bar{g} : \mathbb{R} \longrightarrow \mathbb{R}^n$

$$D\left(f(\bar{g}(x))\right) = Df(\bar{g}(x)) \cdot D\bar{g}(x) = \underbrace{\nabla f(\bar{g}(x))}_{1\text{xn MATRIS}} \cdot \underbrace{\bar{g}'(x)}_{n\text{x1 MATRIS}}$$