Diferenciální počet

transformace nezávisle proměnných $u, v \longrightarrow x, y$

$z = z(u, v)$ $\qquad u = u(x, y), \;\; v = v(x, y)$

jakobián transformace

$$\mathrm{J}\,(u, v \to x, y) = \begin{vmatrix} \left(\frac{\partial u}{\partial x}\right)_y & \left(\frac{\partial v}{\partial x}\right)_y \\ \left(\frac{\partial u}{\partial y}\right)_x & \left(\frac{\partial v}{\partial y}\right)_x \end{vmatrix} = \left(\frac{\partial u}{\partial x}\right)_y \left(\frac{\partial v}{\partial y}\right)_x - \left(\frac{\partial v}{\partial x}\right)_y \left(\frac{\partial u}{\partial y}\right)_x = \frac{\partial(u,v)}{\partial(x,y)}$$

$\uparrow$

jiné označení

výhoda: dá se s ním zacházet jako s obyčejným zlomkem

např.: $$\frac{\partial(u,v)}{\partial(x,y)} = \frac{1}{\frac{\partial(x,y)}{\partial(u,v)}}$$

$$\mathrm{J}\,(u, v \to x, y) = \frac{1}{\mathrm{J}\,(x, y \to u, v)}$$

speciální případy:

$u, v \longrightarrow u, y$

$$\mathrm{J}\,(u, v \to u, y) = \underbrace{\left(\frac{\partial u}{\partial u}\right)_y}_{=1} \left(\frac{\partial v}{\partial y}\right)_u - \left(\frac{\partial v}{\partial u}\right)_y \underbrace{\left(\frac{\partial u}{\partial y}\right)_u}_{=0} = \frac{\partial(u,v)}{\partial(u,y)} = \left(\frac{\partial v}{\partial y}\right)_u$$

analogicky: $$\frac{\partial(u,v)}{\partial(v,y)} = -\left(\frac{\partial u}{\partial y}\right)_v$$