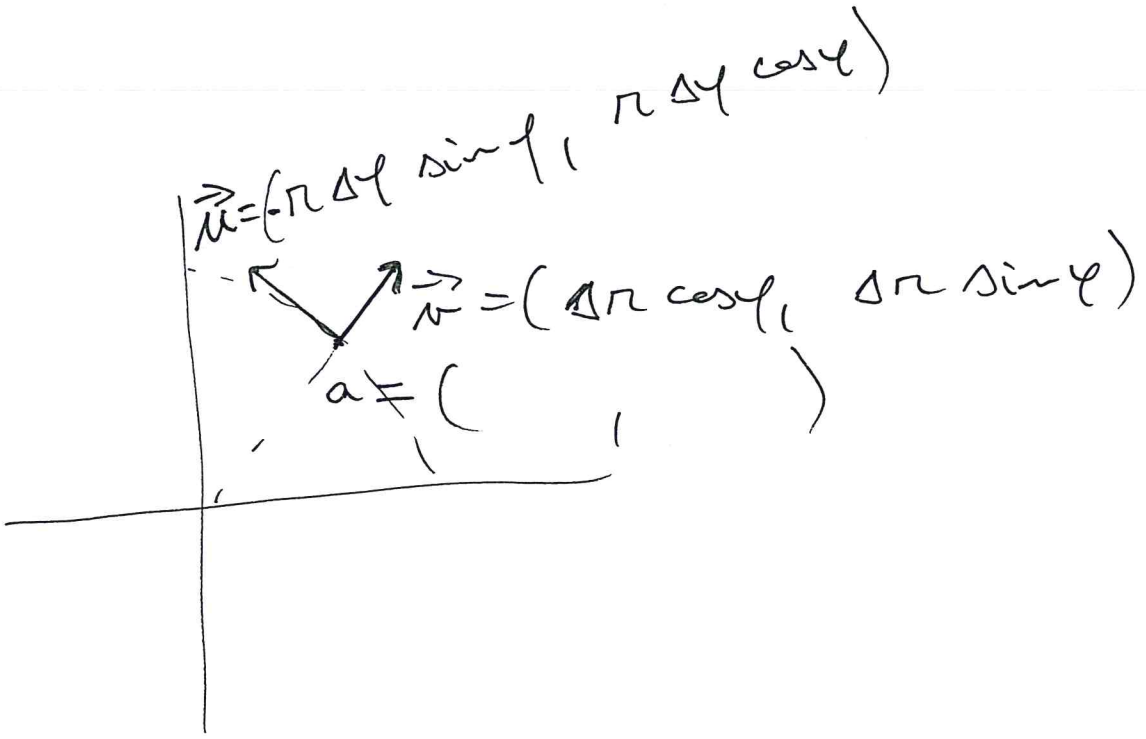

$$D_v f(a) = v \cdot \operatorname{grad} f(a)$$

$$\Delta r\cos\varphi \frac{\partial f}{\partial x}(a) + \Delta r\sin\varphi \frac{\partial f}{\partial y}(a)$$

$$\Delta r\left(\cos\varphi \frac{\partial f}{\partial x} + \sin\varphi \frac{\partial f}{\partial y}\right)$$

$$D_u f(a) = -r\Delta\varphi\sin\varphi \frac{\partial f}{\partial x}(a) + r\Delta\varphi\cos\varphi \frac{\partial f}{\partial y}(a)$$

$$\Delta\varphi\left(-r\sin\varphi \frac{\partial f}{\partial x}(a) + r\cos\varphi \frac{\partial f}{\partial y}(a)\right)$$

Derivace složené funkce

$$\left(f(g(x))\right)' = f'(g(x)) \cdot g'(x)$$

$\mathbb{R}^1 \to \mathbb{R}^1 \to \mathbb{R}^1$

$x \quad g(x) \quad f(g(x))$

Dvě proměnné:

$$g(r,\varphi) = f(r\cos\varphi,\ r\sin\varphi)$$

$\mathbb{R}^2 \to \mathbb{R}^2 \to \mathbb{R}^1$

$r,\varphi \qquad x,y$

$$\frac{\partial g}{\partial r} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial r} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial r}$$

$\cos\varphi \qquad\qquad \sin\varphi$

$$\frac{\partial g}{\partial \varphi} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial \varphi} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial \varphi}$$

$-r\sin\varphi \qquad\qquad r\cdot\cos\varphi$

$$g(t) = f(x(t), y(t))$$

$$g'(t) = \frac{\partial f}{\partial x} \cdot x' + \frac{\partial f}{\partial y} \cdot y'$$

$$\mathbb{R}^1 \to \mathbb{R}^2 \to \mathbb{R}^1$$

$t \qquad x, y$