Aufgabe 18.22

Sei $f(x,y) = u(\xi, \eta) = \sin\xi + \xi^2\eta$ mit $\xi = x^2 + y^2,\ \eta = xy.$ Berechnen Sie $\dfrac{\partial f}{\partial x}$ und $\dfrac{\partial f}{\partial y}$!

Lösung:

$$\frac{\partial f}{\partial x} = \frac{\partial u}{\partial \xi}\frac{\partial \xi}{\partial x} + \frac{\partial u}{\partial \eta}\frac{\partial \eta}{\partial x} = (\cos\xi + 2\xi\eta)\,2x + \xi^2 y = 2x\cos(x^2+y^2) + (x^2+y^2)(5x^2+y^2)\,y,$$

$$\frac{\partial f}{\partial y} = \frac{\partial u}{\partial \xi}\frac{\partial \xi}{\partial y} + \frac{\partial u}{\partial \eta}\frac{\partial \eta}{\partial y} = (\cos\xi + 2\xi\eta)\,2y + \xi^2 x = 2y\cos(x^2+y^2) + (x^2+y^2)(x^2+5y^2)\,x$$