SCHEMA SOLUZIONE 2 PARTE ESAME 15 7 2015

Es. 1 $f(x,y) = \begin{cases} \frac{x^2-2x}{y-1} & y \neq 1 \\ 0 & y = 1 \end{cases}$

$\frac{\partial f}{\partial x} = \frac{2x-2}{y-1} \quad y \neq 1 \qquad \frac{\partial f}{\partial x}(2,3) = 1$

su $(2,3)$ piano tg $z = x-2$

$\frac{\partial f}{\partial y} = \frac{x^2-2x}{(y-1)^2} \quad y \neq 1 \qquad \frac{\partial f}{\partial y}(2,3) = 0$

$\frac{\partial f}{\partial x}(x,1) = \frac{d}{dx} f(x,1)\Big|_{x=0} = 0$

$\frac{\partial f}{\partial y}(x,1) = \frac{d}{dy}(f(x,y))\Big|_{y=1} = \begin{cases} \text{non esiste se } x \neq 0, x \neq 2 \\ 0 \text{ se } x=0, x=2 \end{cases}$

$D_v f(1,1) \quad \hat{v} = (\cos\theta, \operatorname{sen}\theta) \quad$ se $\operatorname{sen}\theta \neq 0$

$g(t) = f(x_0 + t\cos\theta, y_0 + t\operatorname{sen} t) = \frac{(1+t\cos\theta)^2 - 2(1+t\cos\theta)}{t\operatorname{sen}\theta}$

$g(t) = \frac{-1+t^2\cos^2\theta}{t\operatorname{sen}\theta} \qquad g'(t) = \frac{2t\cos^2\theta}{t\operatorname{sen}\theta} - \frac{-1+t^2\cos^2\theta}{t^2\operatorname{sen}\theta}$

$g'(t) = \frac{t^2\cos^2\theta + 1}{t^2\operatorname{sen}\theta}$

$\lim_{t\to 0} g'(0) = +\infty$ le derivate direzionali in $(1,1)$ non esistono

il gradiente $\nabla f(1,1)$ non esiste perché $\frac{\partial f}{\partial y}(1,1)$ non esiste.

La funzione non è differenziabile in $(1,1)$.