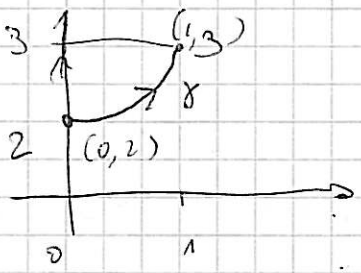
(2) a) $\frac{\partial}{\partial y}\left(x+\frac{x}{x^2+y^2}\right) = -\frac{2xy}{(x^2+y^2)^2}$ $\qquad \frac{\partial}{\partial x}\left(\frac{y}{x^2+y^2}\right) = -\frac{2xy}{(x^2+y^2)^2}$

F è chiusa

b) F è conservativa e $U(x,y) = \frac{1}{2}\log(x^2+y^2) + \frac{x^2}{2}$

c)



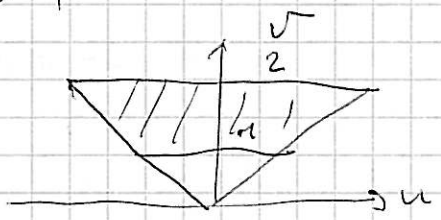
$$\int_\gamma F \cdot dS = U(1,3) - U(0,2) =$$

$$= \log\sqrt{10} + \frac{1}{2} - \log 2$$

(3) a) ϕ è ovviamente iniettiva e suriettiva

$$|J\phi| = \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \neq 0$$

$$T = \begin{cases} u+v \leq 0 \\ v-u \geq 0 \\ 1 \leq v \leq 2 \end{cases}$$



$$\iint_D \frac{x^2-y^2}{(x+y)^2}\,dx\,dy = \frac{1}{2}\iint_T \frac{uv}{v^2}\,du\,dv = 0 \quad \text{per simmetria}$$