(6) $y e^{-2x^2} - 2x e^{-y} = f(x,y)$

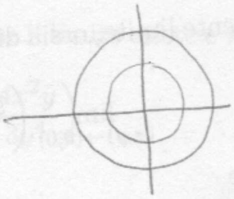
$x_0 = 1 \quad f(1,y) = 0 \quad y = 2 \quad g(1) = 2$

$\frac{\partial f}{\partial x} = y(-4x)e^{-2x^2} - 2e^{-y}$

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

$g'(1) = -\frac{-8e^{-2} - 2e^{-2}}{3e^{-2}} = \frac{10}{3}$

(7) $\iint \frac{|xy|}{x^2+y^2}\, dx\, dy$



a) $\int_1^2 \int_0^{2\pi} \frac{\rho^2 |\cos\theta \sin\theta|}{\rho^2}\, \rho\, d\rho = \frac{1}{2}\rho^2 \Big|_1^2 \int_0^{2\pi} |\cos\theta \sin\theta|\, d\theta =$

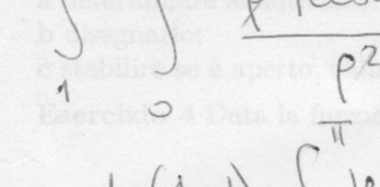
$= \frac{1}{2}(4-1) \int_{-\pi}^{\pi} |\cos\theta \sin\theta|\, d\theta = \frac{3}{2} \cdot 2 \int_0^{\pi} |\cos\theta \sin\theta|\, d\theta =$

$|\cos\theta \sin\theta|$ è pari $= 3 \int_0^{\pi} |\sin\theta \cos\theta|\, d\theta =$

$= 3\left[\int_0^{\pi/2} \sin\theta \cos\theta - \int_{\pi/2}^{\pi} \sin\theta \cos\theta\, d\theta\right] = \frac{3}{2}\left[\sin^2\theta \Big|_0^{\pi/2} - \sin^2\theta \Big|_{\pi/2}^{\pi}\right] =$

$= \frac{3}{2} \cdot 2 = 3$ oppure $\int_0^{2\pi} |\cos\theta \sin\theta|\, d\theta = 4 \int_0^{\pi/2} \sin\theta \cos\theta\, d\theta$

$= 4 \cdot \frac{1}{2} \sin^2\theta \Big|_0^{\pi/2} = 2$



b) $\iint_D \frac{|xy|}{x^2+y^2}\, dx\, dy = \int_0^3 \int_0^{\frac{4}{3}x} \frac{xy}{x^2+y^2}\, dx\, dy =$

$= \int_0^3 x \left(\frac{1}{2} \lg(x^2+y^2) \Big|_0^{\frac{4}{3}x}\right) dx = \frac{1}{2} \int_0^3 x \left[\lg \frac{25}{9} x^2 - \lg x^2\right] dx =$

$= \frac{1}{2} \int_0^3 x \lg \frac{25}{9}\, dx = \frac{1}{2} \lg \frac{25}{9} \cdot \frac{9}{2} = \frac{9}{4} \lg \frac{25}{9}$