Analysis - Tutorial.

(1) Let $f: \mathbb{R}^2 \to \mathbb{R}^2$ be defined by $f((r,\theta)) = (r\cos\theta, r\sin\theta)$. Check at which points inverse function theorem is applicable.

(2) Evaluate $\iint_R x e^{xy}\, dA$ where $R = [-1, 2] \times [0, 1]$

(3) let $f(x,y) = \dfrac{xy(x^2-y^3)}{(x^2+y^3)^3}$ if $(x,y) \neq (0,0)$ & $f((0,0)) = 0$.

Evaluate the iterated integrals:

(4) use change of variables to convert cartesian coordinates into polar coordinates.

(5) Evaluate $\int_C y^3 dx - x^3 dy$ where C is the positively oriented circle of radius 2 centred at the origin.

(6) Use Green's theorem to find the area of a disk of radius 'a'.

(7) Show that C^1 diffeomorphisms are Lipschitz.