

MULTI VARIABLE CALCULAS & ODE FINAL REVISION

Q1) $\iint \frac{xy}{\sqrt{x^2 + y^2}} dx dy$ $D: \begin{cases} x^2 + y^2 \leq 1 \\ xy \leq 0 \end{cases}$ Hints: Use change in polar coordinates

Q2) $x^4 + y^4 - 2x^2 + 2y^2 - 1$ find extrema(min, max)

Q3) $S: 4z - x^2 - y^2 = 0$, find eq of Tangent plane(TS) and Normal Tangent plane equation NS

Q4) $f(x, y) = \sqrt{64 - x^2 - y^2}$ find Domf and sketch jmf and GF

Q5) $f(x, y) = x^2 + y^2 - \frac{xy}{\sqrt{x^2 + y^2}}$ $x = r \cos \theta, y = r \sin \theta$, find $f_r, f_{rr'}, f_{\theta\theta}$

Q6) $\iint x^3 y dx dy$ $D: \begin{cases} \alpha_1 = y = x^2 \\ \alpha_2 = y = x^3 \end{cases}$

Q7) $\iiint \left(\frac{1}{2}x + 1\right)^2 \sin \frac{y}{4} z^3 dx dy dz$ $D: \begin{cases} 0 \leq x \leq 1 \\ 0 \leq y \leq 2\pi \\ 1 \leq z \leq 2 \end{cases}$

Q8) Given Tetra $A(1,0,1), B(1,2,-1), C(2,1,2), D(-2,1,0)$

1) Write down the eq of the face ABC

2) Find the angles of ABC

3) Write down the eq of altitude from D

4) Find the distance between AB and CD

5) Write down the eq of Circumsphere

6) find area, Volume of the tetra and circumsphere