MULIT VARIABLE CALCULAS & ODE FINAL REVISION

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

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

$Q3)\ S: 4z - x^2 - y^2 = 0, find\ eq\ of\ Tangent\ plane(TS) and\ Normal\ Tangent\ plane\ equation\ NS, at\ P(-2,0,1)$

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

$Q5)\ f(x,y) = x^2 + y^2 - \frac{xy}{\sqrt{x^2 + y^2}}\ x = rcos\emptyset, y = rsin\emptyset, find\ fr\emptyset, frr', f\emptyset\emptyset$

$Q6)\ \iint x^3 y dxdy \;\; D: \begin{cases} \alpha 1 = y = x^2 \\ \alpha 2 = y = x^3 \end{cases}$

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

$Q8)\ Given\ Tetra\ A(1,0,1), B(1,2,-1) C(2,1,2) D(-2,1,0)$
1) $Write\ down\ the\ eq\ of\ te\ face\ ABC$
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) $find\ area, Volume\ of\ the\ tetra\ and\ curcumsphere$