1. The ellipsoid $16x^2 + 4y^2 + z^2 = 16$ intersects the plane $z = 2$ in an ellipse. Find parametric equations for the tangent line of this ellipse at the point $(\sqrt{2}/2, -1, 2)$. 

10 points
2. Find all the second partial derivatives of \( f(x, y) = e^{-x} \cos(xy) \). 10 points
3. Find an equation of the tangent plane to the parametric surface \( x = u^2, \ y = v^2, \ z = uv \) at the point for which \( u = v = 1 \). 

10 points
4. Let $a = xe^{y+z^2}$, $x = 2uv$, $y = u - v$, $z = u + v$. Find $\partial a/\partial u$ and $\partial a/\partial v$ when $u = 3$, $v = -1$. 

10 points
5. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $x^2 + y^2 + z^2 = xyz + 2$. 

10 points
6. Find the maximum rate of change of the function \( f(x, y) = xe^{-y} + ye^{-x} \) at the origin and the direction in which this rate of change occurs.

10 points
7. Find the global minimum and maximum values of the function \( f(x, y) = 3x^2 - y^2 + y \) on the square

\[
\{(x, y) \mid |x| \leq 1, \ |y| \leq 1\}.
\]

10 points
8. Find the local minimum and maximum values and saddle points of the function \( f(x, y) = xy^2 e^{-x^2 - y^2} \). 

10 points
9. Find the minimum and maximum values of the function \( f(x, y, z) = x^6 + y^6 + z^6 \) on the unit sphere \( x^2 + y^2 + z^2 = 1 \).

10 points
10. Find the minimum and maximum values of the function \( f(x, y, z) = 3x - y - 3z \) subject to the constraints \( x + y - z = 0, \ x^2 + 2z^2 = 1 \). 

10 points