

Problem Set 6 - Math Tutorial Calculus II

1. Calculate the partial derivatives of the following functions:

(a) $f(x, y) = \sin(xy) + \cos(xy)$

(b) $f(x, y) = \frac{x^2 - y^2}{x^2 + y^2}$

(c) $F(x, y, z) = \sqrt{x^2 + y^3 + z^4}$

2. Let $f(x, y) = 1 - 9x^2 - 4y^2$. Find the lines tangent to the curves at the given point described in the following.

(a) The curve obtained by intersecting the graph of f with the plane $y = 0$, at the point $(0, 0, f(0, 0))$.

(b) The curve obtained by intersecting the graph of f with the plane $x = 0$, at the point $(0, 0, f(0, 0))$.

(c) The curve obtained by intersecting the graph of f with the plane $y = 1$, at the point $(2, 1, f(2, 1))$.

(d) The curve obtained by intersecting the graph of f with the plane $x = 2$, at the point $(2, 1, f(2, 1))$.

3. Let $f(x, y) = 1 - 9x^2 - 4y^2$. Find equations for the following tangent planes.

(a) The plane tangent to the graph of f which goes through the point $(0, 0, f(0, 0))$.

(b) The plane tangent to the graph of f which goes through the point $(2, 1, f(2, 1))$.

4. Give an equation for the plane tangent to the graph of $z = x^3 - 7xy - e^y$ at $(-1, 0, 0)$.