

Quiz 6, Math 53
July 22, 2008

Solutions of all problems must be accompanied by relevant explanations. Show your work, but not to others.

Problem 1. Consider the function $f(x, y) = x^2 + \sin y$ and the point $A(1, 0)$.

- a) Find the directional derivative of f at the point A in the direction of the point $B(4, 4)$.
- b) Find any direction where the directional derivative of f at A is
 - largest,
 - smallest,
 - equal to 0.

Find the values of the largest and smallest directional derivatives.

Problem 2. Find all points on the surface $x^2 + xy + y^2 + yz + z^2 = 3$ where the tangent plane is orthogonal to both planes $x - y + z = 3$ and $5x + 4y - z = -5$.