MATH 231-01: Homework Assignment 5

6 October 2025

Due: 15 October 2025 by 10:00pm Eastern time, submitted on Moodle as a single PDF.

Instructions: Write your solutions on the following pages. If you need more space, you may add pages, but make sure they are in order and label the problem number(s) clearly. You should attempt each problem on scrap paper first, before writing your solution here. Excessively messy or illegible work will not be graded. You must show your work/reasoning to receive credit. You do not need to include every minute detail; however the process by which you reached your answer should be evident. You may work with other students, but please write your solutions in your own words.

Name:

Score:

1. Find all second partial derivatives of the function $f(x, y) = e^{x/y}$.

2. Find an equation for the plane tangent to the graph of $f(x, y) = \ln(xy^2)$ at the point $(1, -3, \ln 9)$.

3. Let $P(x, y) = y\cos(xy) + 2x$ and $Q(x, y) = x\cos(xy) + 3y^2$. Find a function f such that $f_x = P$ and $f_y = Q$.

4. Let $g(s,t) = f(s+2t, s^2)$, and suppose that $f_x(4,4) = 3$ and $f_y(4,4) = -1$. Find $g_s(2,1)$ and $g_t(2,1)$.

5. Let $g(s,t) = f(s-t, s+t)$, where $f(x,y)$ is a function such that $f_{xx} + f_{yy} = 0$. Show that $g_{ss} + g_{tt} = 0$.