

Math 251: Computational Lab 3

Fall 2019, Sections 1-3

Instructor: Matt Charnley
Recitation Instructor: Some TA
Due Date: September 1, 2019

Introduction

You are encouraged to discuss this assignment with other students and with the instructor/recitation instructor, but the work you hand in should be your own. See the website

<http://math.rutgers.edu>

for more information as well as helpful background information and commands for completing the assignment.

The goal of this assignment is to visualize the tangent plane to a surface and see how the way we compute these in Calculus 3 is related to what you have done previously in Calculus 1.

Your Task

For this lab, the individualized data from your instructor will be a function $f(x, y)$, a function $g(x, y, z)$, a value $x = A$ and a pair of values $(x, y) = (B, C)$. With this information, you will need to

- Sketch the curve that satisfies $f(x, y) = 0$.
- Find the tangent ‘planes’ (they are really tangent lines) to the curve $f(x, y) = 0$ where the x-coordinate is A .
- Sketch the surface that satisfies $g(x, y, z) = 0$.
- Find the tangent planes to the surface $g(x, y, z) = 0$ where the x and y coordinates are B and C respectively.

Deliverable

Your code should consist of the following:

1. A sketch of the curve(s) satisfying $f(x, y) = 0$.
2. Compute the points of the form (A, y) that are on the curve.

3. Find an equation of the tangent line to the curve $f(x, y) = 0$ at each point of the form (A, y) .
4. Draw a plot of this curve $f(x, y) = 0$ along with the tangent lines.
5. Using the computer software, find an equation of the form $y = h(x)$ that represents this curve near the point with larger y coordinate, and use Calculus 1 techniques to find an equation of the tangent line at that point. **In words**, compare and contrast your two results.
6. Draw a sketch of the surface $g(x, y, z) = 0$.
7. Compute the points of the form (B, C, z) that are on this surface.
8. Find an equation of the tangent plane to the surface $g(x, y, z) = 0$ at each point of the form (B, C, y) .
9. Draw a plot of this surface $g(x, y, z) = 0$ along with the tangent planes. It will likely be helpful to show one plot for each tangent plane.

Print all of your code (after removing all of the incorrect lines) and the desired images from above and put them into a single stapled packet. This assignment is due on **September 1, 2019** in recitation.