BRAC UNIVERSITY

Inspiring Excellence

Department of Mathematics and Natural Sciences

MAT 110

ASSIGNMENT 3

SUMMER 2021

SET: 6 (MJM)

Please write your name and ID on the first page of the assignment answer script - you have to do this for both handwritten or LaTeX submission. The last date of submission is 10-8-2021, 1159 pm. Solve all problems.

You can only submit a PDF file - image or doc files won't be accepted. Before submitting the PDF, please rename the PDF file in the format - SET_ID_SECTION.

Answer the questions by yourself. Plagiarism will lead to an F grade in the course. ***Total marks is 300. Each question is worth 50 marks.****If you do your work using LaTeX you will get a mark which will be added as a LaTeXbonus to your course grade.*

If you use LaTeX, you must add a screenshot of the raw code and compiled pdf side by side, in order to earn your bonus.

This set was prepared by MJM. If you have any questions, please text MJM on Slack.

1. Calculate the third degree Taylor polynomial of $f(x) = (x-2)e^x$ centered at $x = 2$. Express the coefficients in terms of e.

2. Calculate the Maclaurin polynomials p_0, p_1, and p_2 for the function

$$f(x) = e^{\sin x}$$

3. Find expressions for f_{xx} and f_{yy} for the multivariable function

$$f(x, y) = \ln(x^2 y) + y^3 x^2$$

4. Given that $x(t) = t^2 + 2$, $y(t) = t$ and $f(x, y) = y^2 \sin(xy) + x^2 y$. Using the chain rule for partial derivatives find an expression for $\dfrac{df}{dt}$ and evaluate it when $t = 0$.

5. Find all the first order partial derivatives of the function

$$g(u, v, w) = \cos\left(\frac{u}{v^2 + u}\right) - \frac{6u^2 + v}{w^2 - v^2}$$

6. If $g(x, y, z) = z^3 x^3 \sin(y^2) + x^3 \cos(y^3)$, find an expression for g_{zyx} and evaluate it at the point $(1, \sqrt{2\pi}, 1)$. Write your answer in terms of π.