BRAC UNIVERSITY

Inspiring Excellence

Department of Mathematics and Natural Sciences

MAT 110

ASSIGNMENT 2

SUMMER 2021

SET: 1 (SKN)

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 17-7-2021, 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 SKN. If you have any questions, please text SKN on Slack.

1. American Airlines requires that the total outside dimensions (length+width+height) of a checked bag not exceed 62 inches. Suppose you want to check a bag whose height is same as its width. What is the largest volume bag of this shape that you can check on an American Air Flight?

2. Find 2nd derivative($\frac{d^2y}{dx^2}$) of $\tan y = \frac{x-1}{x+1}$ in terms of x.

3. Find the equation of the tangent line to the graph of $y = \ln(x^2+4) - x\arctan(\frac{x}{2})$ at $x = 2$.

4. If $y = (\sin x)^{\cos x} + (\cos x)^{\sin x} - 5x$, find $\frac{dy}{dx}$.

5. Let $f(x) = x + 2\sin x$ over the interval $[0, 2\pi]$. Use the first and second derivatives of f to determine where f is increasing, decreasing, concave up, and concave down. Locate all inflection points,if they exist.

6. Find the relative extrema of $f(x) = 3x^5 - 5x^3$.