BRAC UNIVERSITY

Inspiring Excellence

Department of Mathematics and Natural Sciences

MAT 120

ASSIGNMENT 5

SPRING 2021

SET: 3

Please write your Name, ID and Section 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 "15/04/2021". 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 "250".****It will be converted to 25 and if you do your entire work using LaTeX you will get a bonus 50 marks. Which will be converted to 5. So highest marks you can get out of 25 is 30 provided you do everything correct and you submit your assignment in*

1. Evaluate the triple integral $\int\int\int_G xy\sin(yz)\,dV$; G is the rectangular box defined by the inequalities $0 \le x \le \pi,\ 0 \le y \le 1, 0 \le z \le \pi/6$.
2. Evaluate the triple integral $\int\int\int_G y\,dV$; G is the solid enclosed by the plane $z = y$, the xy-plane, and the parabolic cylinder $y = 1 - x^2$.
3. Evaluate the triple integral $\int\int\int_G xyz\,dV$; G is the solid in the first octant that is bounded by the parabolic cylinder $z = 2 - x^2$ and the plane $y = x$, $z = 0,\ y = 0$.

4. Use a triple integral to find the volume of the solid bounded by the surface $z = \sqrt{y}$ and the planes $y + x = 1,\ z = 0,\ x = 0$.

5. Do the following tasks using Mathematica.

   (a) Solve the differential equation:

   $$dx + e^{3x}dy = 0$$

   (b) Plot multiple solutions of the differential equation in a with values of constant c=-2,-1,0,1,2 in a single graph

   (c) Plot the numerical solution of the differential equation for $0 \leq x \leq 10$:

   $$y'' - y = x^2\ ,\ y(0) = 0\ ,\ y(1) = 0$$