BRAC UNIVERSITY

Inspiring Excellence

MAT120

Integral Calculus and Differential Equations

Assignment 02

Summer 23

Instructions:
Submit your assignment in A4 paper.Assignment should be handwritten.Please write your Name, ID and Section on the cover page of your assignment answer script. No late submission will be allowed after the class time.

Solve all problems.Answer the questions by yourself. Plagiarism will lead to an F grade in the course. Each question carries 10 mark. Total marks is 50 and it will be converted to 10.

1. Evaluate the iterated integral by converting to polar co-ordinates:

$$\int_{-4}^{0}\int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} 3x \; dy \; dx$$

2. Use spherical coordinates to find the volume of the solid within the sphere $x^2+y^2+z^2 = 9$, outside the cone $z = \sqrt{x^2+y^2}$, and above the $xy-$plane.

3. Use the transformation $u = x+y,\ v = x-y$ to find $\int\int_R (x-y)e^{x^2-y^2}\ dA$. Where R is the rectangular region enclosed by the lines $x+y=0$,$x+y=1$, $x-y=1$, $x-y=4$.

4. Separate x and y variable and solve the following I.V.P:

$$x\sin y\ dx + (x^2+1)\cos y\ dy = 0;\ \ y(1) = \frac{\pi}{2}$$

5. Solve the following ODE by introducing integrating factor on the process of your calculation:

$$x\frac{dy}{dx} + (3x+1)y = e^{-3x}$$