



Department of Mathematics and Natural Sciences

MAT 120

ASSIGNMENT 4

SPRING 2021

SET: 11

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 "8/04/2021". 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 $\int_0^4 \int_0^x \sqrt{1+x^2} \, dy \, dx$.
2. Use double integral to evaluate the area of the circle $x^2 + y^2 = a^2$.
3. Evaluate $\int \int (x+y) \, dx \, dy$ over the region bounded by $x \geq 0, y \geq 0, x+y \leq 1$.
4. Use double integral to evaluate the area of the region bounded by the curves $y = 4 - x^2$ and $y = x^2 - 4$.
5. Do the following tasks using Mathematica.

A bug is crawling on a xy- coordinate plane, with distance measured in meters and time measured in seconds. The x - and y -coordinates of the bug are given by the equations $x = \sin(2t), y = \cos t$

- (a) Graph the path of the bug.
- (b) Find the distance covered by the bug at $0 \leq t \leq 4$ seconds.
- (c) The bug starts to fly at $t = 4$ seconds with the coordinates given by $x = \cos t$, $y = \sin t$ and $z = \cos(2t)$. Graph the path of the bug for $4 \leq t \leq 12$.