



Department of Mathematics and Natural Sciences

MAT 110

FINAL ASSIGNMENT

SUMMER 2021

SET: 08(AQD)

Please write your name and ID on the first page of the assignment answer script. The deadline is 10th September, 9.00 am to 11.30 am. 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 350.** It will be converted to 20. If you have issues with the questions, please contact AQD on Slack.*

1. Find the relative extrema (if any) of the function $f(x) = x^4 - 12x^3$.
2. Find the Taylor Series for $f(x) = \frac{1}{x+2}$ about $x = 3$
3. Find $\frac{\partial T}{\partial r}$ and $\frac{\partial T}{\partial \theta}$ of function $T = x^2y - xy^3 + 2$; $x = r \cos \theta$ and $y = r \sin \theta$
4. Determine the critical points and locate any relative minima, maxima and saddle points (if any) of function f defined by $f(x, y) = x^2 + xy + y^2 - 3x$.
5. Calculate the second-degree Taylor polynomial of $f(x, y) = \tan^{-1}(x + 2y)$ at the point $(1, 0)$.
6. Compute the Divergence and Curl of the following vector \vec{F} : $\vec{F} = e^x \vec{i} + \ln(xy) \vec{j} + e^{xyz} \vec{k}$
7. Write the equation into the standard form of the equation of the hyperbola: $-x^2 + 4y^2 - 2x - 16y + 11 = 0$. Locate the centre, vertices and foci of the hyperbola.