HOME ASSIGNMENT (2025 Batch)
MA/MSC IN MATHEMATICS
(SECOND SEMESTER)
CENTRE FOR DISTANCE AND ONLINE EDUCATION
DIBRUGARH UNIVERSITY

(Full Marks 20 for each course)

Course: MATH-201 (Complex Analysis)

Assignment 1 (10)

(i).

State and prove **Cauchy's Integral Formula**. Using the formula, evaluate

$$\int_C \frac{e^z}{z-1}\,dz,$$

where C is the circle $|z| = 2$.

Assignment 2 (10)

(i)

Expand the function

$$f(z) = \frac{1}{z^2-1}$$

as a **Laurent series** valid in the annulus $1 < |z| < \infty$. Hence, classify the singularities of $f(z)$.

Course: MATH-202 (Tensor)

Assignment 1 (10)

(i)

State and prove the properties of the **Kronecker delta**. Using Kronecker delta and permutation symbol, show that

$$\epsilon_{ijk}\epsilon_{lmk} = \delta_{il}\delta_{jm} - \delta_{im}\delta_{jl}.$$

Assignment 2 (10)

(i) Explain the meaning of **covariant derivative**. Derive the expression for the divergence of a vector field in tensor notation.

Course: MATH-203 (Differential Equations and Integral Equations)

Assignment 1 (10)

(i)Solve by Monge's method

$$r-2s+t=0$$

Assignment 2 (10)

(i) Define the **Fredholm determinant**. Explain how it is used to solve Fredholm integral equations of the second kind.

Course: MATH-204 (Inviscid Fluid Mechanics)

Assignment 1 (10)

(i) Define **streamlines** and **pathlines**. Distinguish between steady and unsteady flows with examples. Derive the **equation of continuity** for a three-dimensional incompressible fluid.

Assignment 2 (10)

(i) State and prove **Bernoulli's equation** for steady motion under conservative forces. Explain its physical significance.

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