

Make up test – 12th January 2024

1. Compute the determinant of the matrix A given as

$$A = \begin{pmatrix} 1 & 1 & 0 \\ 2 & -1 & -1 \\ 1 & 0 & 3 \end{pmatrix}.$$

2. Solve

$$\begin{aligned} x + 2y - z &= 4 \\ -x + 3y + z &= 1 \\ 2x + 2y + z &= 3. \end{aligned}$$

3. Compute

$$\lim_{x \rightarrow \infty} \frac{x^3 + 3x - 2}{x^2(2x - 1)}.$$

4. Determine whether the function

$$f(x) = x\sqrt{x^2 - 1}$$

is even or odd and justify your claim.

5. Compute  $f'$  and  $f''$  for the function

$$f(x) = \frac{\sin x}{x^2}.$$

6. Determine the intervals where is the function

$$f(x) = e^x(x - 2)^2$$

increasing.

7. Find the first partial derivatives of

$$f(x, y) = \frac{x + y}{y^2}.$$

8. Examine the local extremes of

$$f(x, y) = x^2 + 2xy + 2y^2 - 12x + 8y + 5$$