Make up test – 5th January 2024

1. Are vectors $u = (1, 1, -1)$, $v = (2, 0, 1)$ and $w = (1, -1, 2)$ linearly independent?

2. Find the eigenvalues of $A = \begin{pmatrix} 1 & 3 \\ 3 & 4 \end{pmatrix}$.

3. Compute
$$\lim_{x \to 0} \frac{\sin(4x)}{3x \cos x}$$

4. Find the maximal domain of
$$f(x) = \frac{1}{\sqrt{x^2 - 4}}$$

5. Compute f' and f'' for the function
$$f(x) = e^{\frac{2}{x}}.$$

6. Find the extremes of
$$f(x) = x^4 - 8x^2.$$

7. Find the first partial derivatives of
$$f(x, y) = xe^{x - 2y}.$$

8. Find the stationary points of
$$f(x, y) = x^2 + 4xy - y^2$$