Make up test – 26th January 2024

1. Solve
$$2x + 3y = -1$$
$$3x + 5y = -2$$

2. Let the matrices A and B be given as
$$A = \begin{pmatrix} 2 & 3 & -1 \\ 1 & 2 & 1 \end{pmatrix}, \; B = \begin{pmatrix} -2 & 1 \\ 1 & -1 \end{pmatrix}.$$
Compute
$$C = A^T B.$$

3. Decide, whether the quadratic form
$$Q(x, y) = x^2 + 2x + y^2$$
is positive definite, negative definite or indefinite.

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

5. Compute f' and f'' where
$$f(x) = \sqrt{\cos x}.$$

6. Determine the interval where the function
$$f(x) = x^3 - 3x^2.$$
is increasing and where it is decreasing.

7. Find the stationary points of
$$f(x, y) = x^2 y^2 - x^2 - y^2.$$

8. Find the first partial derivatives and the second partial derivative of
$$f(x, y) = xe^{x-y}$$