Linear Algebra Assignment

Answer all questions. Show complete working steps where applicable. Each question carries equal marks.

1. Compute the determinant of the following matrix: A = [[2, 3, 1], [4, 1, -3], [1, 2, 0]].

2. Find the inverse of the matrix B = [[1, 2], [3, 4]].

3. Solve the system of linear equations using the matrix method: 2x + y - z = 8, -3x - y + 2z = -11, -2x + y + 2z = -3.

4. Determine whether the set of vectors {(1,2,3), (2,4,6), (3,6,9)} is linearly independent.

5. Find the eigenvalues and eigenvectors of the matrix C = [[4, 1], [2, 3]].

6. Verify that the matrix D = [[1, 0], [0, -1]] is orthogonal.

7. Express the vector (3, 4, 5) as a linear combination of the basis vectors {(1,0,0), (0,1,0), (0,0,1)}.

8. Find the rank of the matrix E = [[1,2,3], [2,4,6], [1,1,1]].

9. Determine if the matrix F = [[1,2], [2,1]] is diagonalizable.

10. If T is a linear transformation defined by T(x, y) = (x + 2y, 3x + 4y), find the matrix representation of T.

End of Assignment