**KABARAK UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**MAIN CAMPUS**

**SECOND SEMESTER 2021/2022 ACADEMIC YEAR**

**EXAMINATION FOR THE BACHELOR OF SCIENCE**

**MATH211: LINEAR ALGEBRA I**

**STREAM: Y2/S1 REGULAR TIME: 9:00-11:00AM**

**EXAMINATION SESSION: MAY - AUGUST DATE: 24/08/2021**

**INSTRUCTIONS TO CANDIDATES**

* **Answer Question 1 and any other two questions in the answer booklet provided.**
* **Do not write on your question papers. All rough work should be done in your answer booklet.**
* **Clearly indicate which question you are answering.**
* **Write neatly and legibly.**
* **Edit your work for language and grammar errors.**
* **Follow all the instructions in the answer booklet**

**SECTION A: (COMPULSORY) TOTAL MARKS FOR THIS SECTION IS 30.**

**QUESTION ONE (30 MARKS)**

1. Given the matrix . Find the matrices
2. (2Marks)
3. (2 Marks)
4. (2 Marks)
5. Solve the following system of equations using the **Cramer’s Rule**

(5Marks)

1. Let be the vector space of polynomials of degree over Determine whether are independent or dependent vectors, where

(5 Marks)

1. Use the properties of determinants to find and (4Marks)
2. Write the line in the form and show that it passes through (4 Marks)
3. Reduce the matrix to reduced row-echelon (canonical) form. (6Marks)

**SECTION B. TOTAL MARKS FOR THIS SECTION IS 40.**

**ANSWER ANY TWO QUESTIONS FROM THIS SECTION. EACH QUESTION IN THIS SECTION CARRIES 20 MARKS.**

**QUESTION TWO (20MARKS)**

1. Determine all values of for which is non-singular.

(5 Marks)

1. Solve the following system of equations using the **Gauss Jordan Elimination Method**

(5Marks)

1. If . Find
2. (2 Marks)
3. (3 Marks)
4. (5 Marks)

**QUESTION THREE (20MARKS)**

1. Calculate the scalar product of the following two vectors and comment on their results, = and = (5 Marks)
2. If =, and =. Evaluate

(5 Marks)

1. The equations of two planes are given by and Find the angle between the two planes.

(5 Marks)

1. Find the angle between the vectors and .

(5Marks)

**QUESTION FOUR (20 MARKS)**

1. Show whether or not the following are subspaces of
2. (3Marks)
3. (3Marks)
4. For what value of is a linear combination of the vectors and in (4 Marks)
5. Determine whether the vectors in are linearly dependent. (4 Marks)
6. Let and be the following subspaces of

Find a basis and the dimension of

1. (3 Marks)
2. (3 Marks)

**QUESTION FIVE (20 MARKS)**

1. Find the equation of the plane through and (5Marks)
2. Reduce the matrix to echelon form.

(5 Marks)

1. The planes and are parallel. Find the distance between them. (5 Marks)
2. Solve thefollowing system of equations using the **Inverse Matrix Method**

(5 Marks)