

American International University-Bangladesh

Faculty of Science and Technology

Department of Mathematics

MATH 4 (Matrices, Vectors and Fourier Analysis)

Midterm Examination Spring : 2021-22

Total Marks: 40 Time: 1 hours

Coordinators: Dr. Dilruba Yasmin & Prof. Dr. Kh. Abdul Maleque

Short Questions

1. If and , then find .

1. If and , then find .

1. For which value(s) of , will the matrix be singular?

1. What is the cofactor of of the matrix, ?
2. What is the rank of a matrix ?

1. Write the system of linear equations from the following diagram

.

1. Consider a square matrix, . Find the inverse matrix of A.

1. What is the value of Fourier discrete function at ?

1. Write the definition of even function.

1. Write the definition of odd function.

1. Write the period of the functions,

are real numbers.

1. Write the integral properties of even function *f(x)*in the interval *.*
2. Write the integral properties of odd function *f(x)*in the interval.
3. Find the Fourier coefficient of the function in .

**Broad Questions**

1. Test the consistency of the following system of linear equations:

 .

If consistent, solve the above system.

1. Solve the following system of linear equations by either matrix inversion or Cramer’s rule :

.

1. Determine the values of such that the following system has (a) a unique solution, (b) no solution and (c) more than one solution.
2. Find the Fourier integral of ; .
3. Find the Fourier integral of  ; .
4. Encode the message “DO PRACTICE” by using matrix,

“24 43 32 59 18 36 25 41 32 59 42 63 16 32”

Where A B C D … Y Z space

1 2 3 4 25 26 0

1. The encoded message is 35 55 73 10 20 14 32 46 77. Decode original message by using matrix, “A” given below

**.**

“24 43 32 59 18 36 25 41 32 59 42 63 16 32”

Where A B C D … Y Z space

1 2 3 4 25 26 0

1. Find the Fourier series of the following functions

, .

1. Find half range Fourier sine series of 

1. Find half range Fourier cosine series of 
2. Find the finite Fourier sine transform of the function,

.

1. Find the finite Fourier cosine transform of 
2. Find the half range Fourier cosine/sine series of the following functions:
3. .