

American International University-Bangladesh

Faculty of Science and Technology

Department of Mathematics

MATH 4 (Matrices, Vectors and Fourier Analysis)

**Sample questions for summer semester’22**

Midterm Examination Summer:2021-22

Total Marks: 40 Time: 2 hours

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

Short Questions

1. If , , and , then find (1) ; (2) ; (3) ; (4) ; (5).

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 ?
3. Sketch the figure of the system of linear equations (Geometrical/physical representation) and make the comment(s) about the system of linear equations:

(a) ; (b) ;

(c) ; (d) ;

(e) .

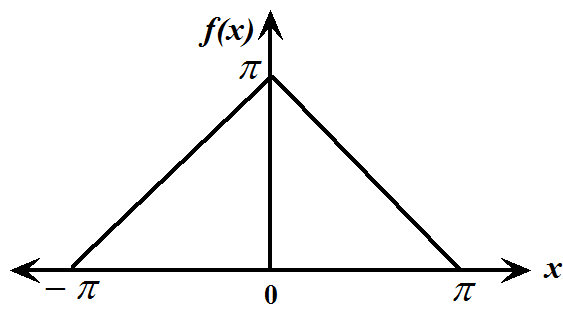
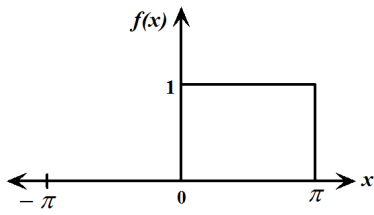
1. Write the system of linear equations from the following diagram at the points A, B, C and D.

.

1. What is the value of Fourier discrete function at ?
2. Find -point DFT for where the unit impulse function, , is defined as Assume that for .
3. Determine the period of the following functions:

1. Determine whether the following functions are even or odd or neither.

1. Find the Fourier coefficient of the function in .
2. Find the Fourier coefficient of the function in .
3. Find the Fourier coefficient of the function in .
4. Write down the functions corresponding to the following figures. Also compute the first few components of the trigonometric Fourier series.
5. (b) (c)

  fourier21.tif

-

**Broad Questions**

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

 .

If consistent, solve the above system of linear equations.

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. 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 half range Fourier cosine/sine series of the following functions:
3. .
4. Find the finite Fourier sine transform of the function,

.

1. Find the finite Fourier cosine transform of 
2. Find the Fourier transform of the following functions and also write the Fourier integral.



1. Find the Fourier integral of ; .
2. Find the Fourier integral of  ; .
3. Solve the following Boundary Value Problem (BVP):

;