**Find EigenValue and EigenVector of the covariance matrix:**

**Solution:**

1.Find Eigenvalue:

To do this, we find the values of λ which satisfy the characteristic equation of the matrix A, namely those values of λ for which:

det(A − λI) = 0

Form the matrix A − λI:

=

Calculate det(C − λI):

det(C − λI) - +

= (1—

= (1+ 2(-4+2)

=

=

Therefore: det(C − λI) =

To find solution: det(C − λI) =0

Solve: = 0

Find:

0.1715728752538099

Therefore, the eigenvalues of C are = 2, = 5.828= 0.172

2.Find Eigen Vector:

Once the eigenvalues of a matrix (C) have been found, we can find the eigenvectors by Gaussian Elimination

STEP 1: For each eigenvalue λ, we have

(C − λI)x = 0,

where x is the eigenvector associated with eigenvalue λ

STEP 2: Find x by Gaussian elimination. That is, convert the augmented matrix

(C – λI: 0)

to row echelon form, and solve the resulting linear system by back substitution

We find the eigenvectors associated with each of the eigenvalues

With =2

-We must find vectors x which satisfy (C − λI)x = 0

– First, form the matrix C − 2I:

- Construct the augmented matrix (C − λI :0) and convert it to row echelon form

-Rewriting this augmented matrix as a linear system gives

So the eigenvector x is given by:

With =5.828

-We must find vectors x which satisfy (C − λI)x = 0

– First, form the matrix C − 2I:

- Construct the augmented matrix (C − λI :0) and convert it to row echelon form

-Rewriting this augmented matrix as a linear system gives

So the eigenvector x is given by:

With =0.172

-We must find vectors x which satisfy (C − λI)x = 0

– First, form the matrix C − 2I:

- Construct the augmented matrix (C − λI :0) and convert it to row echelon form

->

-Rewriting this augmented matrix as a linear system gives

So the eigenvector x is given by: