UDSC – 401 (P)

Session – II (19 December, 2024)

1. Generate two lists of random integers (manually coded logic) of length 5 and calculate their dot product.

2. Ask the user for two lists of integers and compute their dot product if both lists have the same number of elements.

3. Write a program to compute the dot product of two vectors stored in two separate lists, where one list is all zeros.

4. Create a program that calculates the dot product of two vectors containing negative numbers.

5. Write a program to verify if the two vectors are orthogonal.

6. Write a program to input a 3x3 matrix (as a list of lists) and a vector of length 3, then compute their product.

7. Modify Problem 6 to check if the matrix columns match the vector's length. Display an error message if not.

8. Write a program to multiply a 2x2 matrix by a 2-dimensional vector input by the user.

9. Write a program to calculate the product of a 4x4 identity matrix and a 4-dimensional vector. Ensure the output is the same as the original vector.

10. Create a program that multiplies a matrix of size `n x m` with a vector of size `m`. Prompt the user to input values for `n`, `m`, the matrix, and the vector.

11. Write a program that calculates the matrix-vector product for a 2x3 matrix and a vector of size 3.

12. Create a program to calculate the product of a diagonal matrix and a vector. Input the diagonal elements only.

13. Write a Python program to multiply a sparse matrix represented as a list of lists with a vector.

14. Create a program to multiply a 5x5 matrix (randomly populated) with a vector of length 5.

15. Write a program to multiply a row vector with a column vector to produce a matrix.

16. Generate a program to calculate the matrix-vector product of a singular matrix and a vector.

17. Create a program that computes the product of a matrix containing all negative integers with a positive vector.

18. Write a Python program to multiply a lower triangular matrix with a vector, both provided as input by the user.