Name: **Register number:**

CHRIST (Deemed to be University)
Department of Mathematics
Practical examination – November 2022
MAT551 – Linear Algebra using Python

Maximum marks: 10   **Maximum time: 20 minutes**

All questions are compulsory

Part A

Q1. Predict the output of the following code

```
1  import numpy as np
2  B=np.matrix([[1,3,5,7],[7,3,4,1],[1,4,9,4],[7,5,2,0]])
3  B[:,1]+B[:,2]
```

a)
```
matrix([[ 4],
        [10],
        [ 5],
        [12]])
```

b)
```
matrix([[ 4, 10,  5, 12]])
```

c)
```
matrix([[ 8,  7, 13,  7]])
```

d)
```
matrix([[ 8],
        [ 7],
        [13],
        [ 7]])
```

Q2. Which of the following lines of code would produce the output as 5?

```
In [12]:   1  import numpy as np
           2  A=np.matrix([[-1,0,1],[1,-3,-4],[1,4,9]])
           3

Out[12]: 5
```

a) np.linalg.det(A)   b) np.det(A)

c) np.trace(A)   d) A.T

Q3. The Python code to find the rank of a matrix, A, is   _____

Q4. To print the coefficients of the characteristic equation of A, we use _____

Q5. Predict the errors in the following code snippet. Assume that the necessary libraries have been imported

```
In [117]:   1  A1=np.matrix([[1,2,2],[2,4,4],[5,1,1]])
            2  A2=np.matrix([[2],[1],[3]])
            3  np.linalg.solve(A1,A2)
```

Q6. The Python code for finding the nullity of a matrix using the dimensions and the rank of the matrix is

_____

Q7. Correct this code and rewrite it in the space provided

```
3  import numpy as np
4  A=np.matrix([1,-2,3],[-1,3,-1],[2,-5,5])
5  B=np.matrix([9,-6,17])
6
7
8  np.solve(A,B)
```

Q8. The Python command to print the eigen values of a matrix, B, is

    a)   np.eigval(B)   b) np.linalg.eigval(B)

    c) np.linalg.eigvals(B)   d) np.linalg.eig(B)

Q9. In this code, we wish to find the row-reduced echelon form of the matrix. Fill in the blanks as necessary.

```
import _____

B = np.matrix(input("Enter a square matrix : ")

E = _____

Print ("The row echelon form of matrix B and the pivot columns are: {}".format (E))
```

Q10. Predict the output of the following code snippet

```
In [45]:   1  import numpy as np
           2  Arr=np.matrix([[-1,0,1,0],[1,11,-3,-4],[1,4,-2,9],[4,5,-3,2]])
           3  Arr[:,1].reshape(2,2)
```

CHRIST (Deemed to be University)
Department of Mathematics
Practical examination – November 2022
MAT551 – Linear Algebra using Python

Maximum marks: 10   **Maximum time: 25 minutes**

All questions are compulsory

Part B

Q11. Write a Python program to check if the vector (6, 4, 3) is a linear combination of
(1, 2, 1), (3, 1, 2) and (3, 2, 1). If yes, express the same as the linear combination of the listed vectors.

Q12. Write a Python program to find the eigen values and eigen vectors of a matrix entered by the user, and also print the final diagonalized matrix.