PES University, Bangalore

(Established under Karnataka Act No. 16 of 2013)

APRIL 2021: IN SEMESTER ASSESSMENT (ISA) B.TECH. IV SEMESTER

UE19MA251- LINEAR ALGEBRA

Mathematics Lab

Session: Jan-May 2021

NAME OF THE STUDENT : PRIYA MOHATA

SRN : PES2UG19CS301

BRANCH : COMPUTER SCIENCE

SEMESTER & SECTION : SEMESTER IV SECTION E

FOR OFFICE USE ONLY:

Marks : /05

Name of the Course Instructor : Prof.SATYAVANI NL

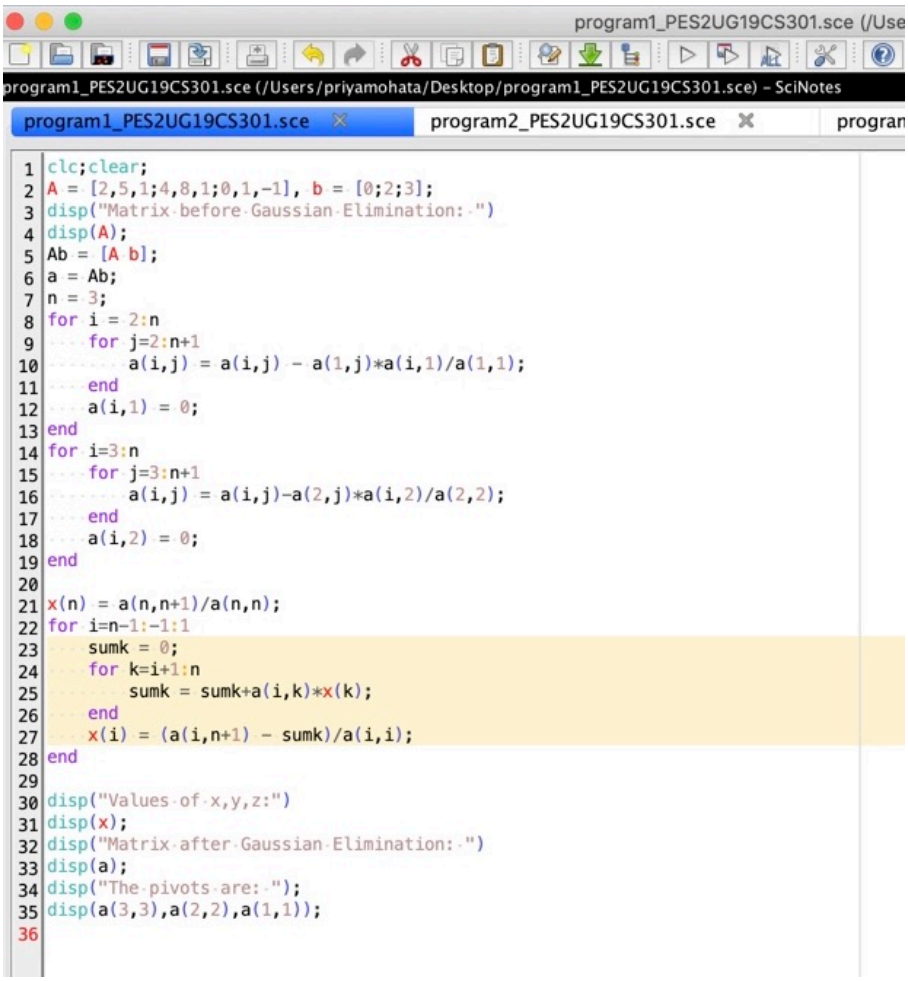
Signature of the Course Instructor : _____

Class Number	Topic
1	Gaussian Elimination
2	The LU Decomposition
3	Inverse of a Matrix by the Gauss- Jordan Method
4	The Span of Column Space of a Matrix
5	The Four Fundamental Subspaces
6	Projections by Least Squares
7	The Gram-Schmidt Orthogonalization
8	Eigen values and Eigen Vectors of a Matrix

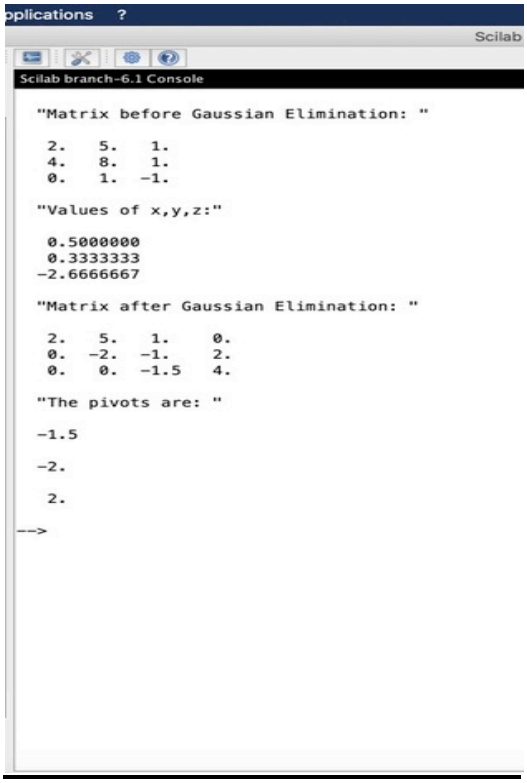
***PROBLEM 1*: Solve the following system of equations by Gaussian Elimination. Identify the pivots.**

2x + 5y + z = 0 , 4x + 8y + z = 2, y –z = 3

PROGRAM CODE



OUTPUT SCREENSHOT

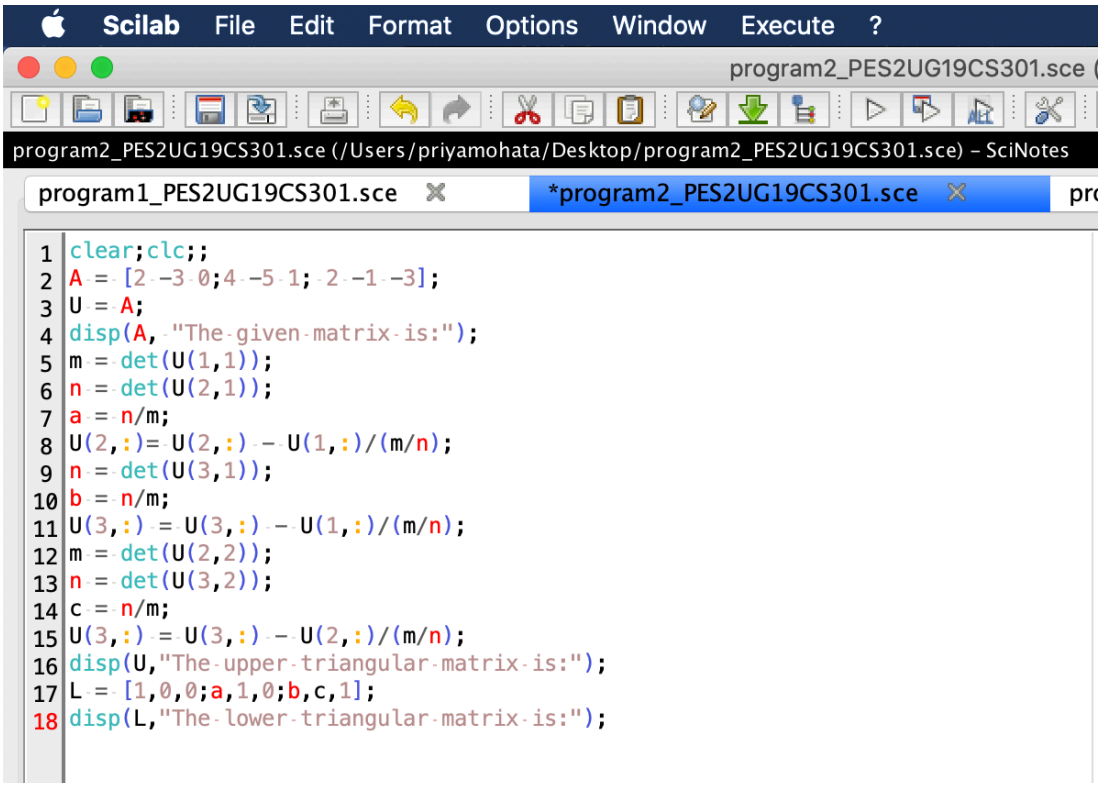


Problem 2:

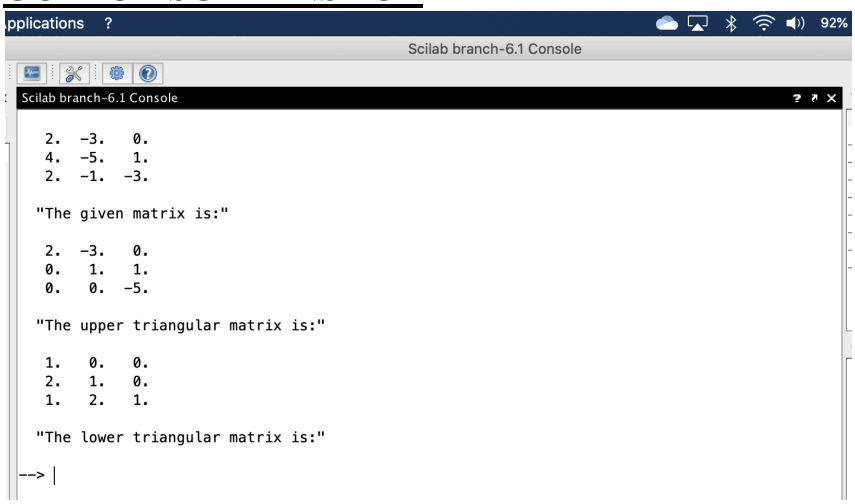
Factorize the following matrices as A = LU

A={[2,-3,0],[4,-5,1],[2,-1,-3]}

PROGRAM CODE



OUTPUT SCREENSHOT

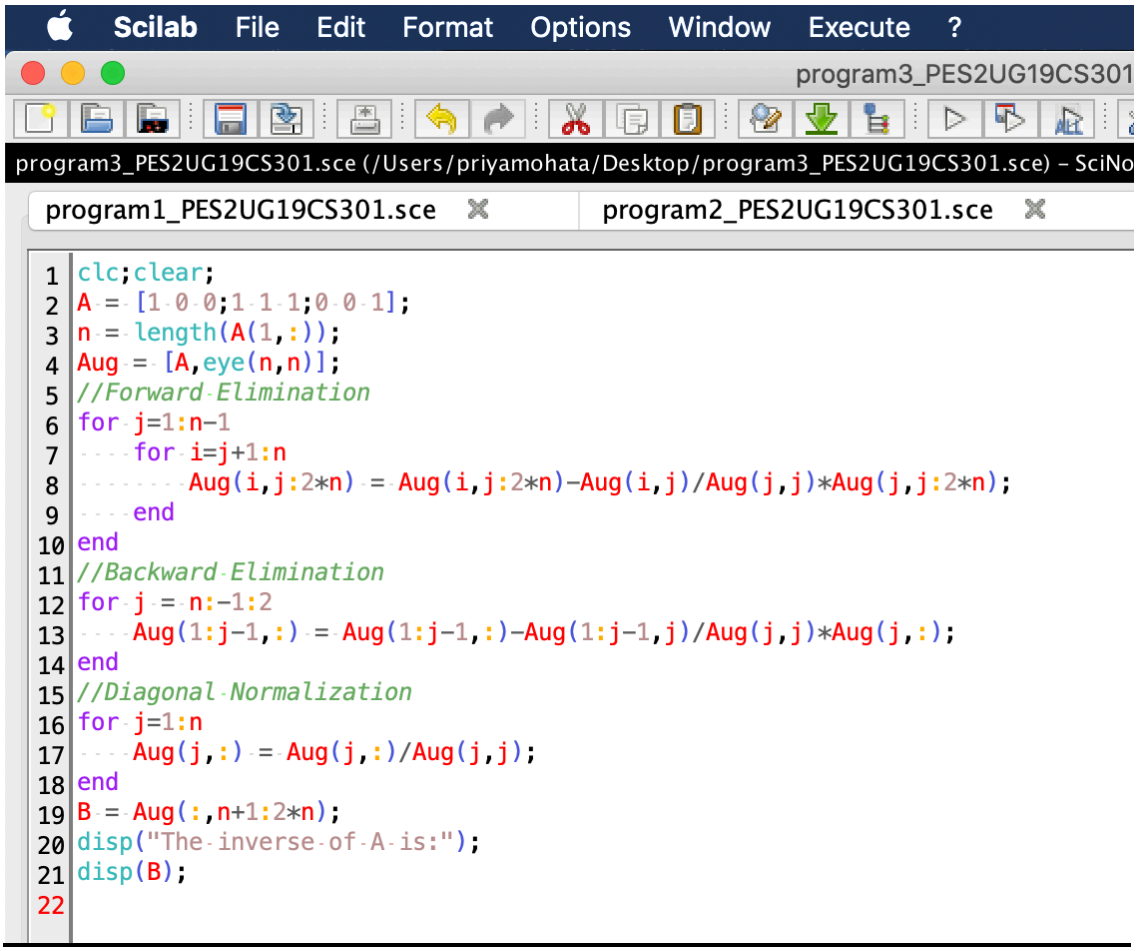


PROBLEM-3

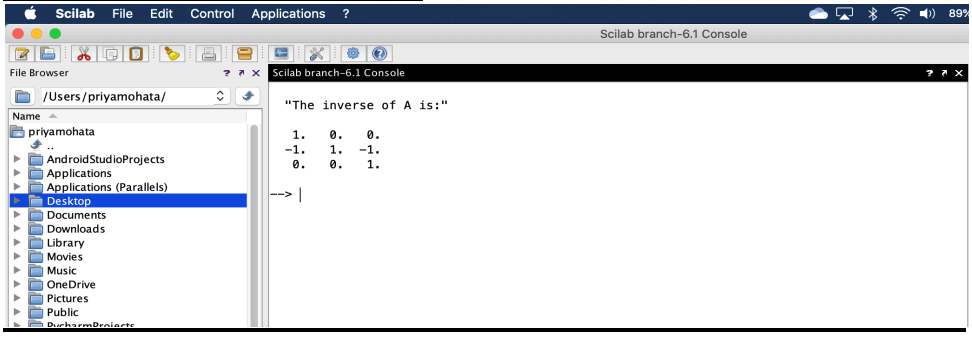
Find the inverse of the following matrix

A={[1,0,0],[1,1,1],[0,0,1]}

PROGRAM CODE



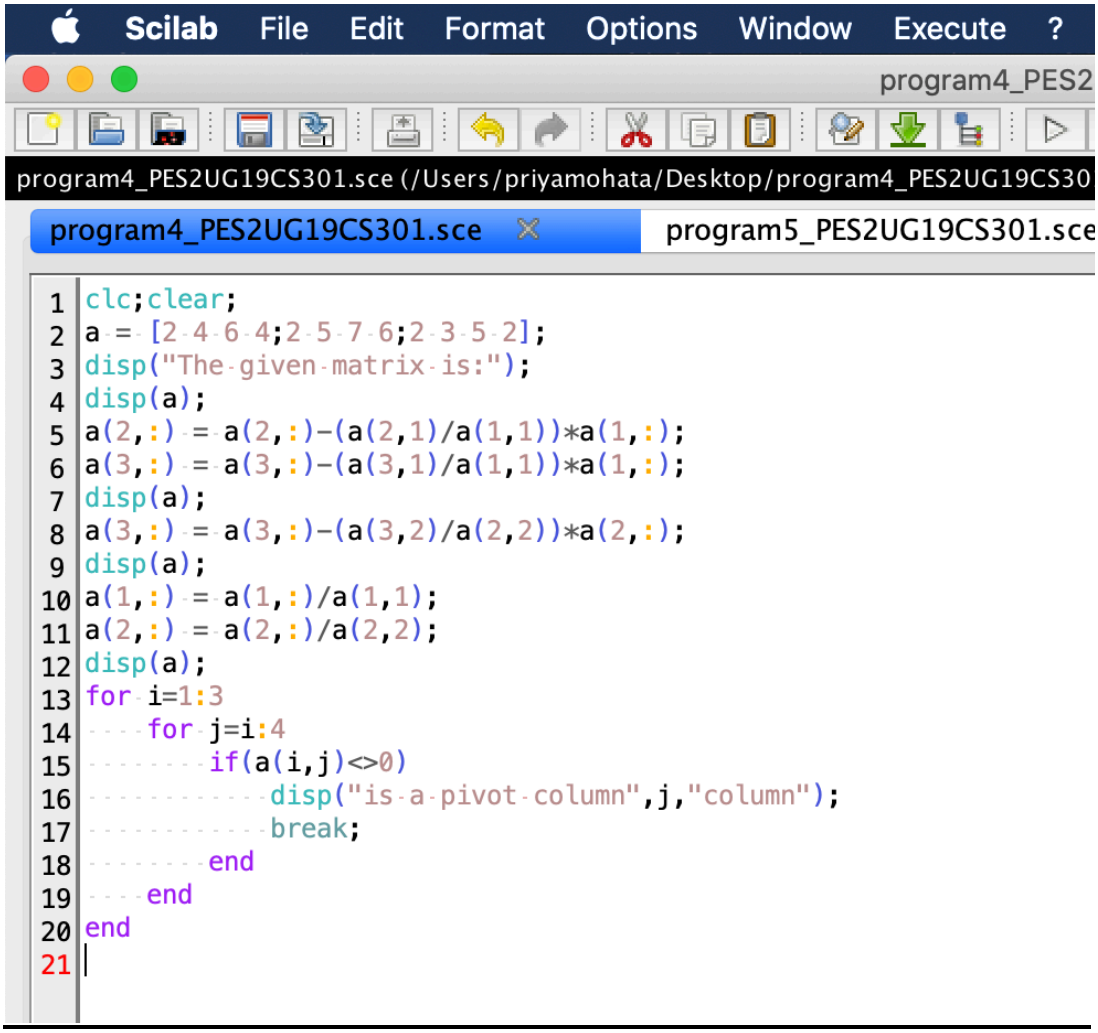
OUTPUT SCREENSHOT



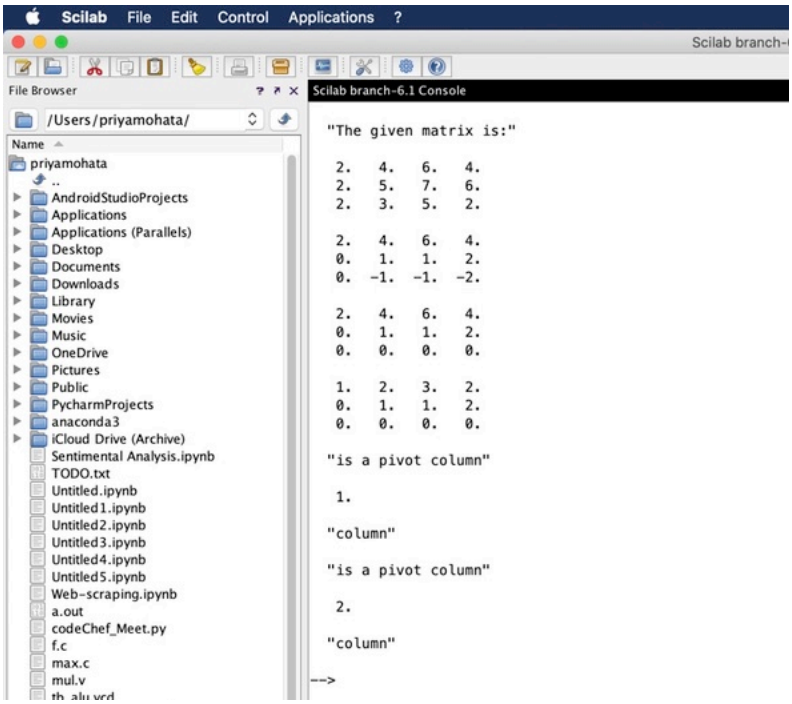
PROBLEM 4

Identify the columns that are in the column space of A where A={[2,4,6,4],[2,5,7,6],[2,3,5,2]}

PROGRAM CODE



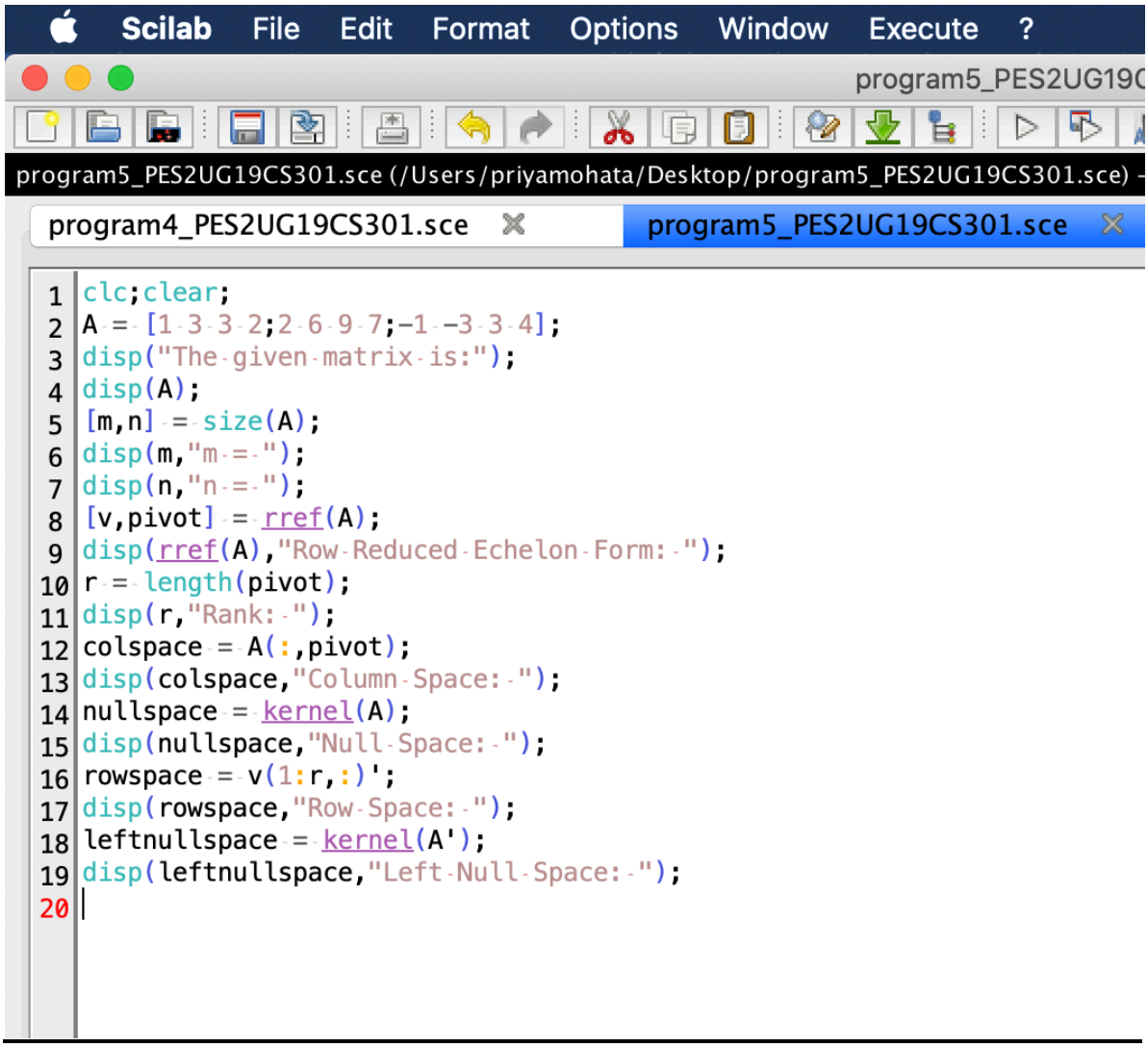
OUTPUT SCREENSHOT



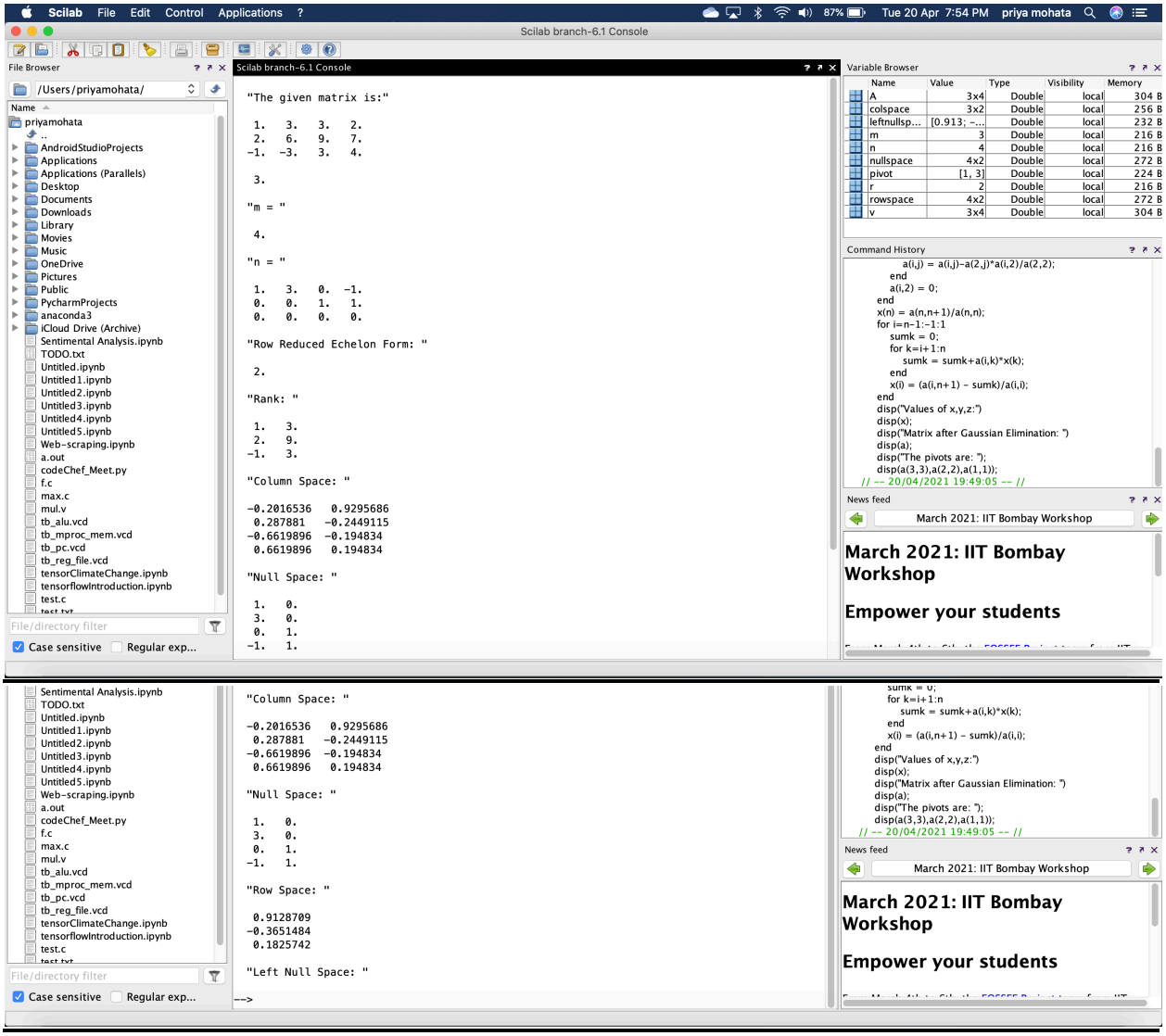
PROGRAM-5

Find the four fundamental subspaces of
A={[1,3,3,2],[2,6,9,7],[-1,-3,3,4]}

PROGRAM CODE



OUTPUT SCREENSHOT

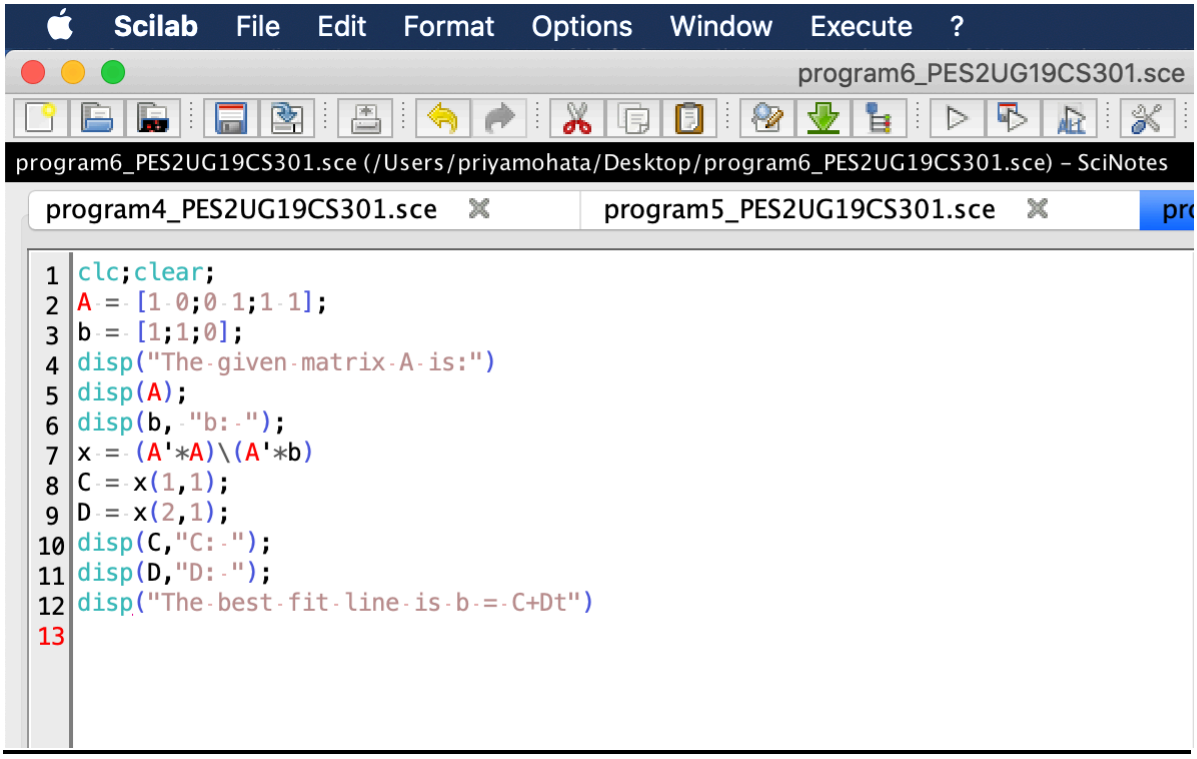


PROGRAM-6

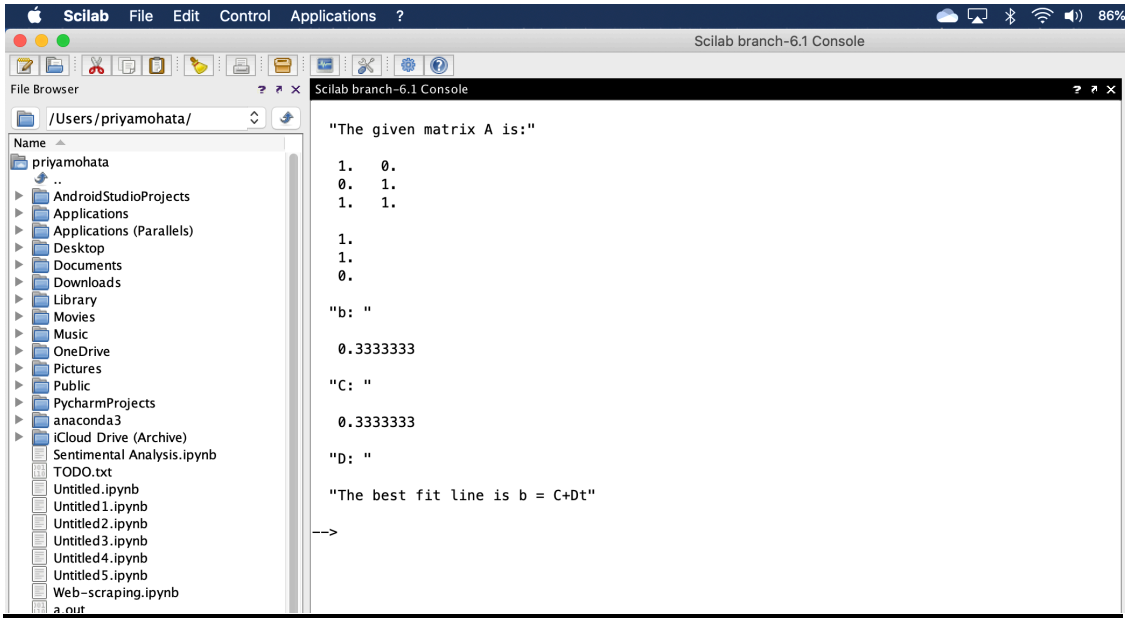
Find the solution x = (C , D) of the system AX = b and the line of best fit C + Dt = b given

A={[1,0],[0,1],[1,1]} and b={[1,1,0]}

PROGRAM CODE



OUTPUT SCREENSHOT

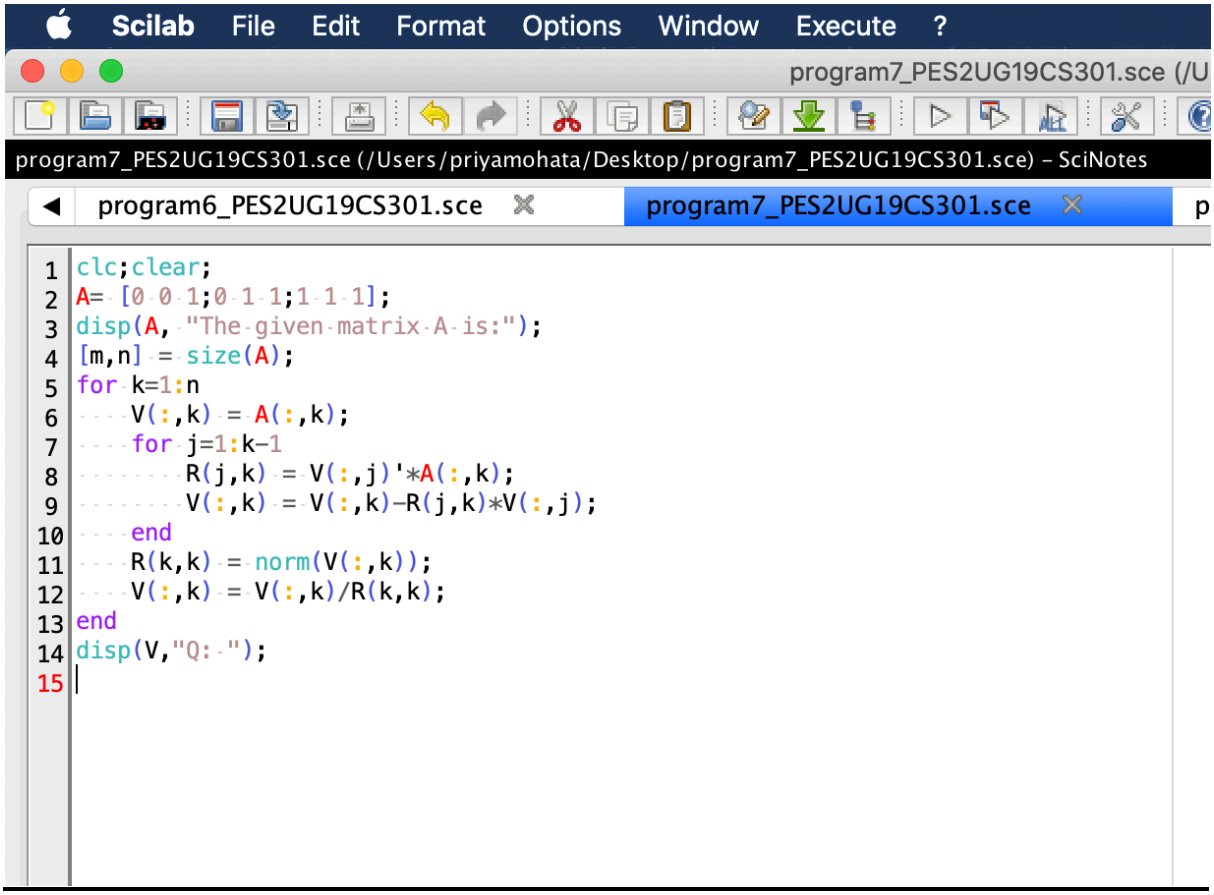


PROGRAM-7

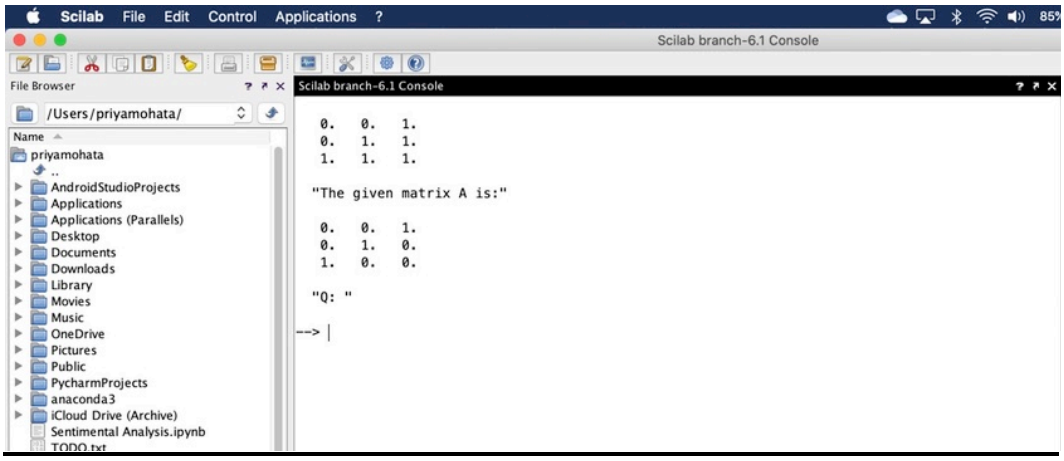
***Apply the Gram – Schmidt process to the following set of vectors and find the orthogonal matrix*:**

(0, 0, 1) , (0, 1, 1) , (1, 1, 1)

PROGRAM CODE



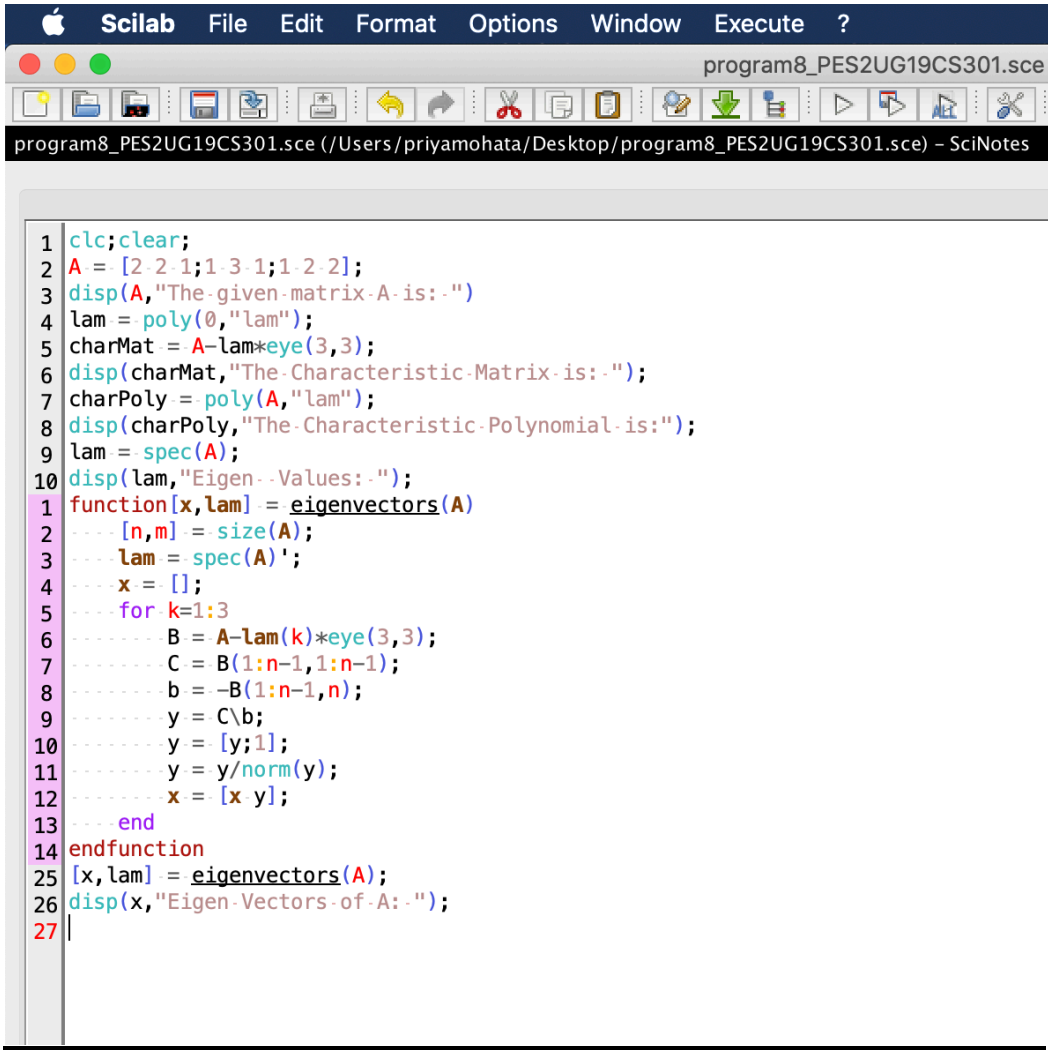
OUTPUT SCREENSHOT



PROGRAM-8

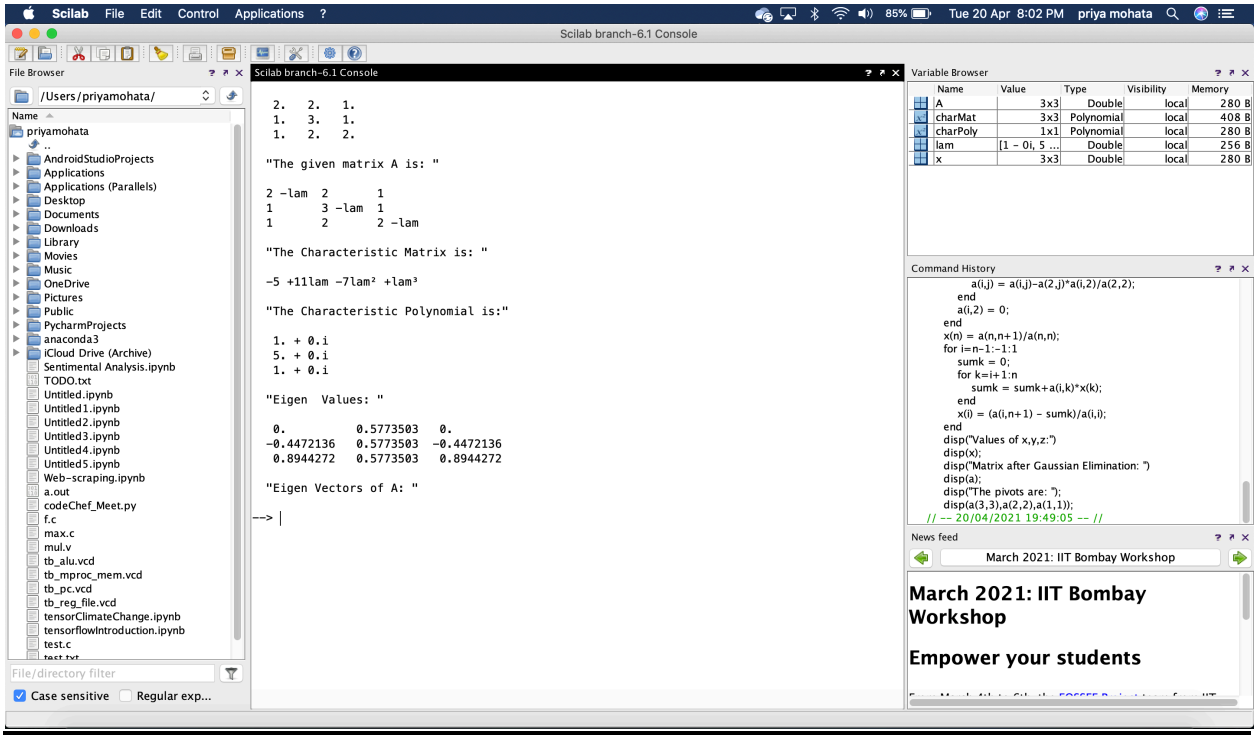
Find the Eigen values and the corresponding Eigen vectors of A={[2,2,1],[1,3,1],[1,2,2]}

PROGRAM CODE




```
clc;clear;
A = [2 2 1;1 3 1;1 2 2];
disp(A,"The given matrix A is:")
lam = poly(0,"lam");
charMat = A-lam*eye(3,3);
disp(charMat,"The Characteristic Matrix is:");
charPoly = poly(A,"lam");
disp(charPoly,"The Characteristic Polynomial is:");
lam = spec(A);
disp(lam,"Eigen Values:");
function[x,lam] = eigenvectors(A)
    [n,m] = size(A);
    lam = spec(A)';
    x = [];
    for k=1:3
        B = A-lam(k)*eye(3,3);
        C = B(1:n-1,1:n-1);
        b = -B(1:n-1,n);
        y = C\b;
        y = [y;1];
        y = y/norm(y);
        x = [x y];
    end
endfunction
[x,lam] = eigenvectors(A);
disp(x,"Eigen Vectors of A:");
```

OUTPUT SCREENSHOT



---------- THANK YOU ----------