DEEN DAYAL UPADHAYA COLLEGE

MATHEMATICS FOR COMPUTING PRACTICAL FILE

SUBMITTED BY :

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ROLL NO : 24HCS4107

COURSE : BSC(H) COMPUTER SCIENCE

SEMESTER : I

<u>QUESTION1.</u> Find cofactors, determinant, adjoint and inverse of a matrix.

<u>ANSWER:</u>

A : matrix([1,5,7], [8,4,6], [9,2,3]);

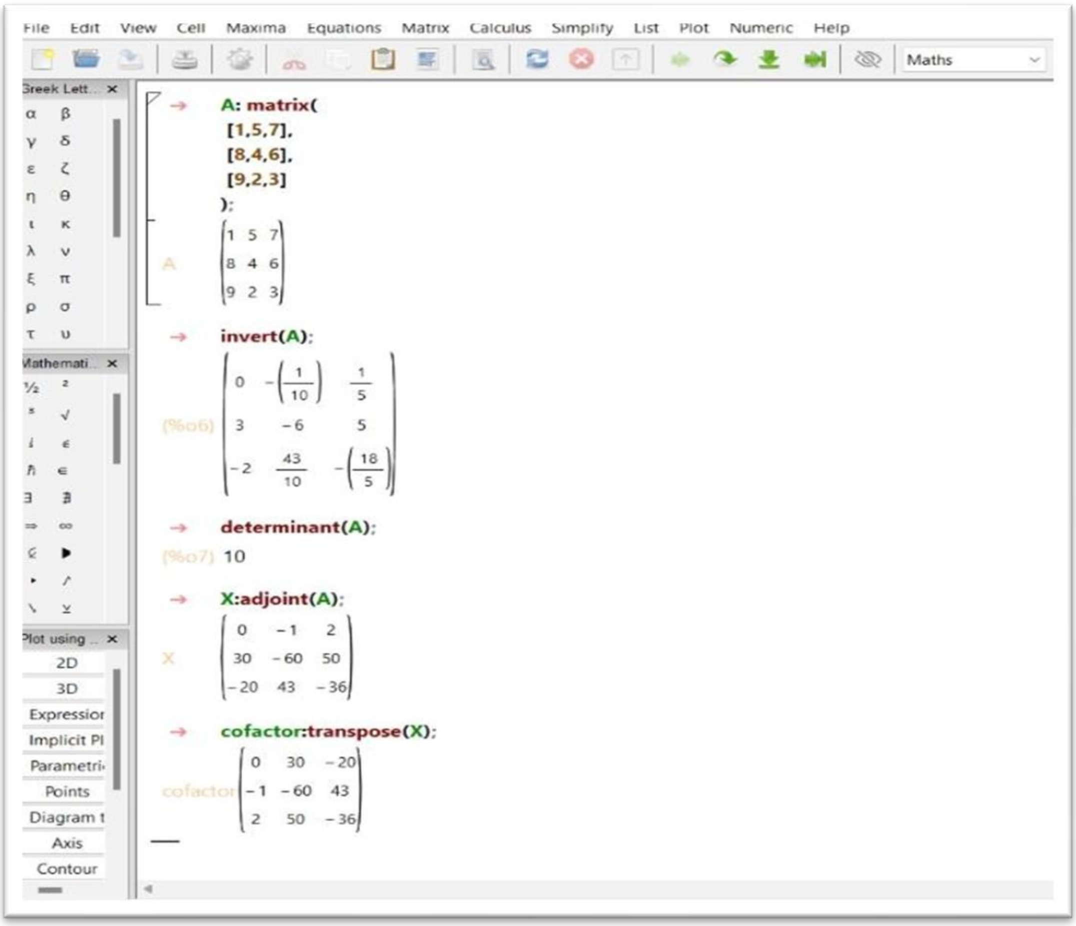
Invert(A);

Determinant(A);

X:adjoint(A);

Cofactor:transpose(X);

<u>OUTPUT:</u>



QUESTION 2: Convert the matrix into echelon form and find its rank.

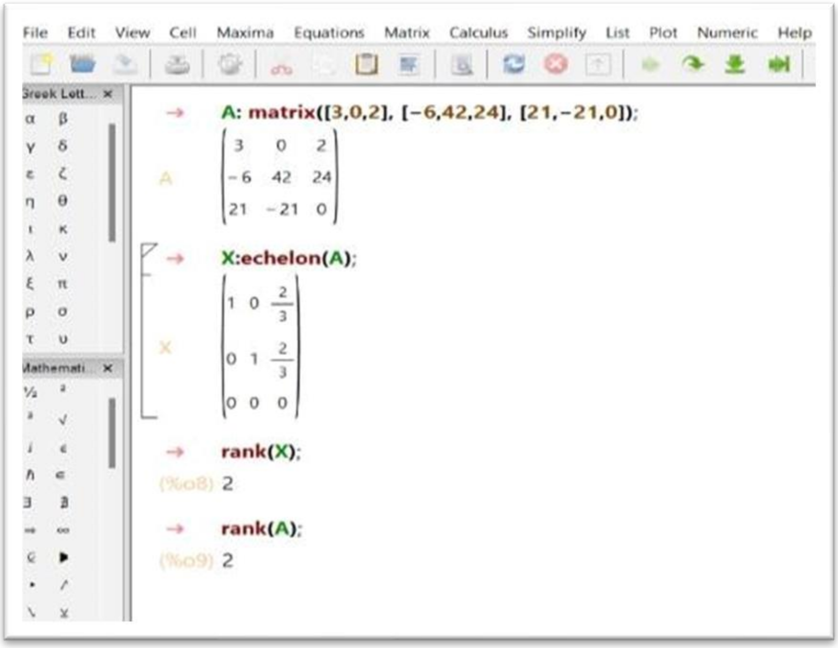
ANSWER:

A: matrix([3,0,2], [-6,42,24], [21,-21,0]);

X:echelon(A);

rank(A);

OUTPUT:



QUESTION 3: Solve a system of equations using Gauss elimination method.

ANSWER:

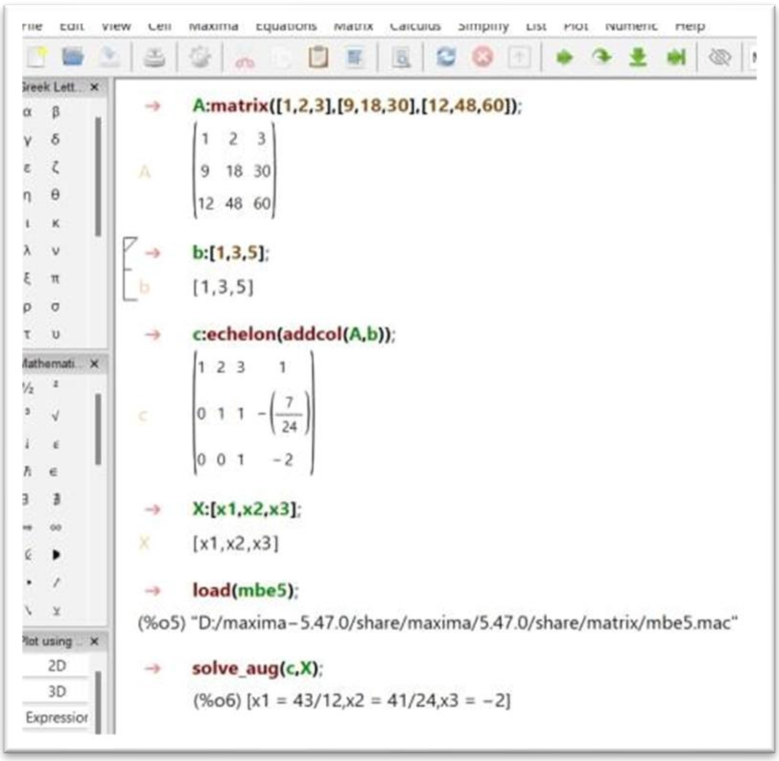
A:matrix([1,2,3],[9,18,30],[12,48,60]);
b:[1,3,5];

c:echelon(addcol(A,b));

X:[x1,x2,x3];

load(mbe5); solve_aug(c,X);

OUTPUT:



QUESTION 4: Solve a system of equations using the Gauss Jordan method.

ANSWER:

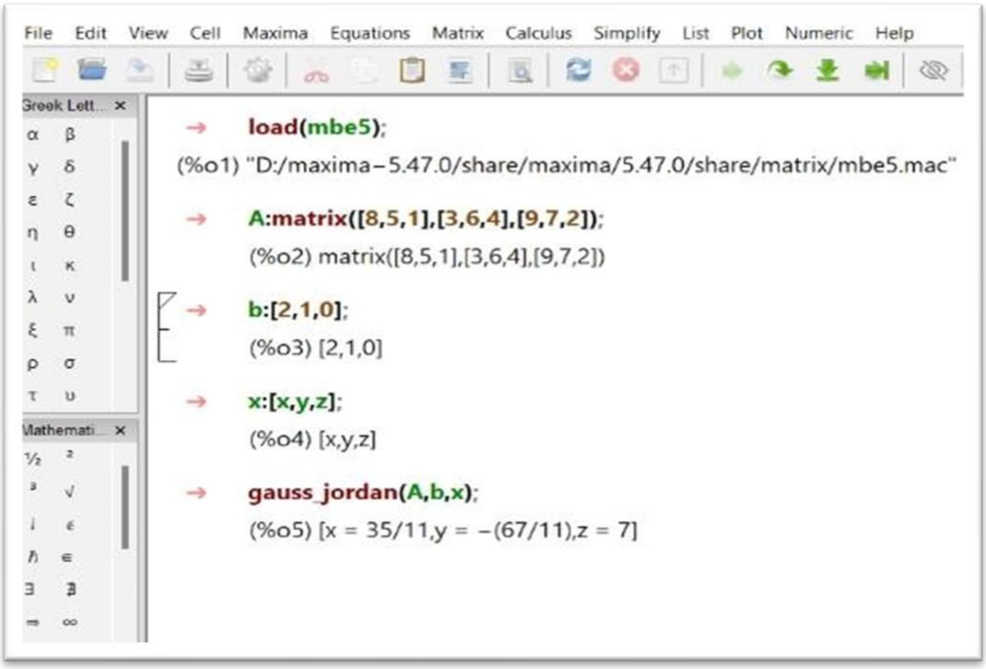
load(mbe5);
A:matrix([8,5,1],[3,6,4],[9,7,2]);

b:[2,1,0];

x:[x,y,z];

gauss_jordan(A,b,x);

OUTPUT:

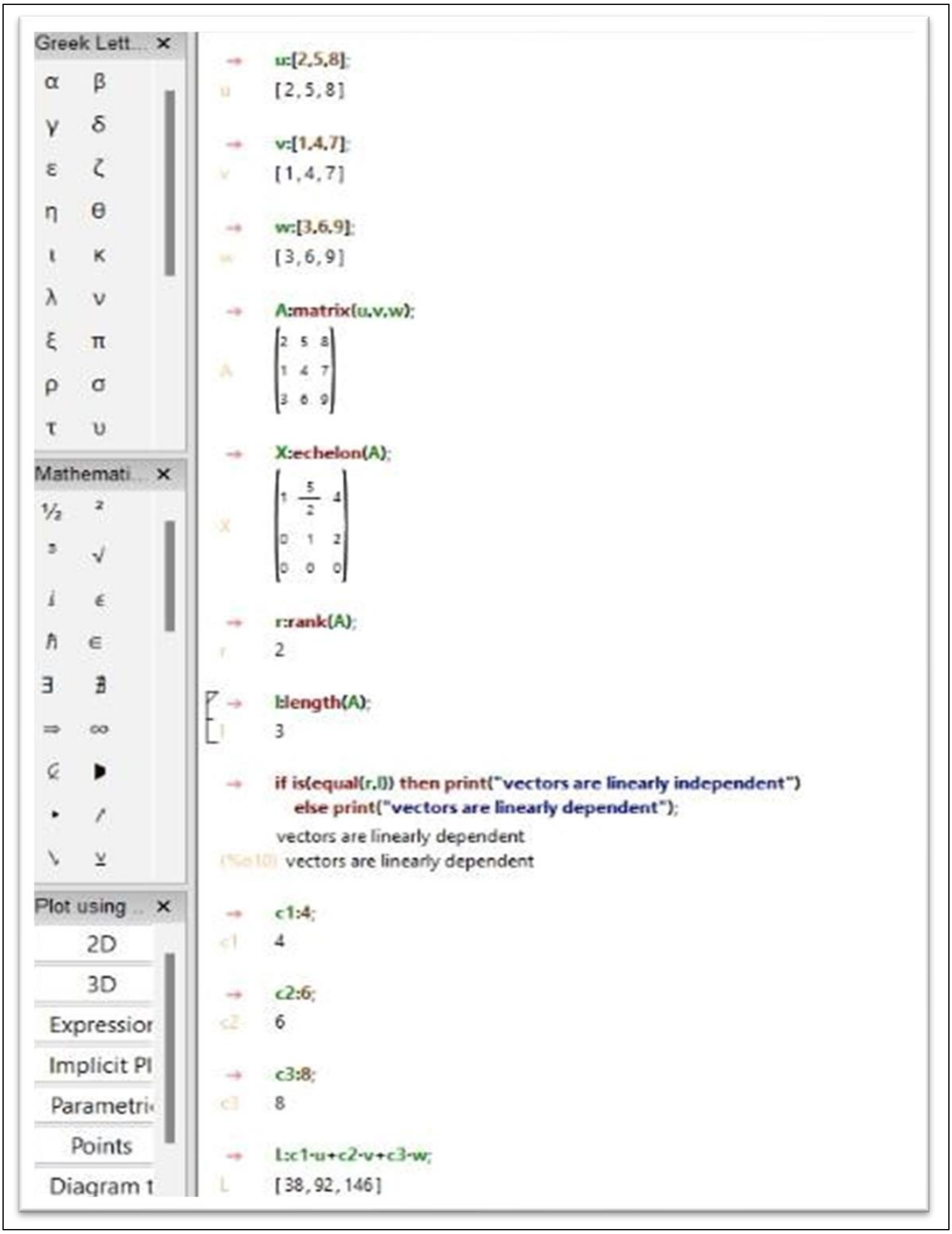


QUESTION 5: Verify the linear dependence of vectors. Generate a linear combination of given vectors of Rn/ matrices of the same size.

ANSWER:

```
u:[2,5,8];
v:[1,4,7];
w:[3,6,9];
A:matrix(u,v,w); X:echelon(A);
r:rank(A);
l:length(A);
if is(equal(r,l)) then print("vectors are linearly
independent") else print("vectors are linearly
dependent");
c1:4;
c2:6;
c3:8;
L:c1*u+c2*v+c3*w;
```

OUTPUT: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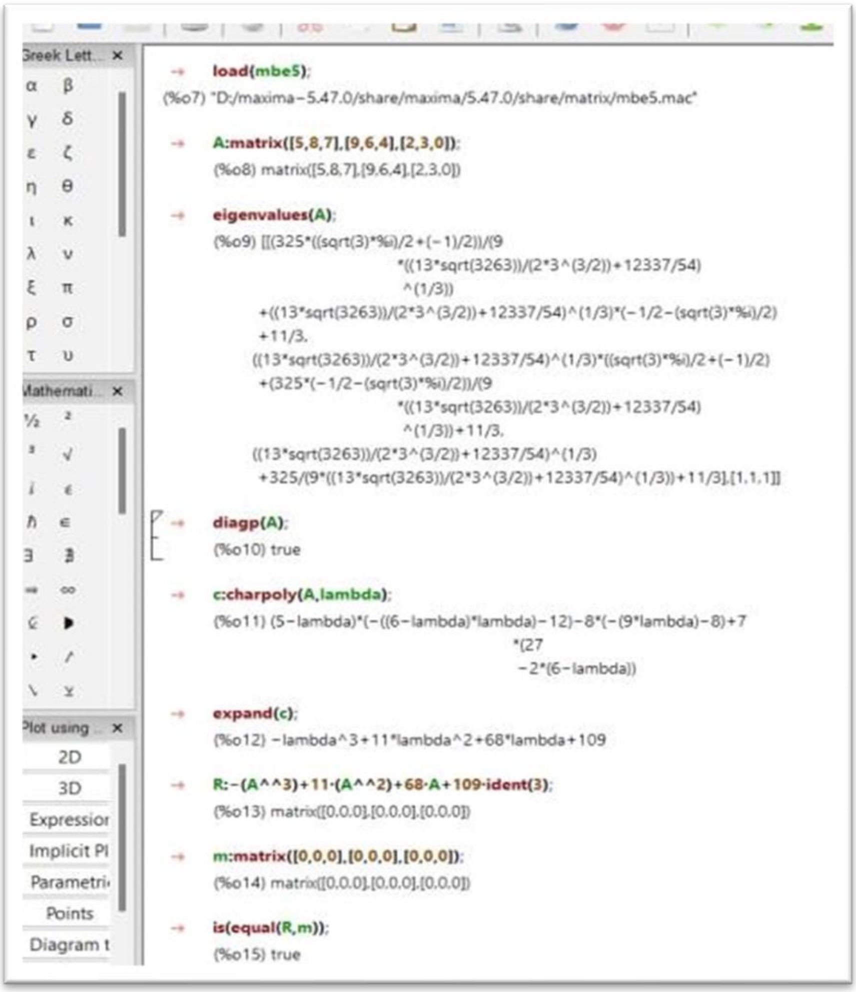
u:[2,5,8];
[2,5,8]
v:[1,4,7];
[1,4,7]
w:[3,6,9];
[3,6,9]
A:matrix(u,v,w);
2 5 8
1 4 7
3 6 9
X:echelon(A);
1 5/2 4
0 1 2
0 0 0
r:rank(A);
2
l:length(A);
3
if is(equal(r,l)) then print("vectors are linearly independent")
else print("vectors are linearly dependent");
vectors are linearly dependent
(%o10) vectors are linearly dependent
c1:4;
4
c2:6;
6
c3:8;
8
L:c1·u+c2·v+c3·w;
[38,92,146]

QUESTION 6: **Check the diagonalizable property of matrices and find the corresponding eigenvalue and verify the Cayley-Hamilton theorem.**

ANSWER:

```
load(mbe5);

A:matrix([5,8,7],[9,6,4],[2,3,0]);

eigenvalues(A);

diagp(A);

c:charpoly(A,lambda);

expand(c);

R:-(A^^3)+11*(A^^2)+68*A+109*ident(3);
m:matrix([0,0,0],[0,0,0],[0,0,0]);

is(equal(R,m));
```

OUTPUT:



QUESTION 7: **Compute Gradient of a scalar field, Divergence and Curl of a vector field.**

ANSWER:

```
load(vect);
F:[z^2,x^2,y^2];
curl(F);
express(curl(F));
ev(express(curl(F)),diff);
G:[3*x*z,2*x*y,-y*z^2];
ev(express(div(G)),diff);
f(x,y,z):=2*y^3+4*x*z+3*x; g:grad(f(x,y,z)); ev(express(g),diff);
```

OUTPUT: