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**Div: 11**

**Batch: K3**

**Subject: LADC**

**Scilab Assignment: 1**

**Que.1)** Find Determinants and Inverse of the following matrices using scilab functions. Also justify the error if any.

**1)**

--> A= [1 2 3;4 3 1;5 2 4]

A = 1. 2. 3.

4. 3. 1.

5. 2. 4.

--> det(A)

ans = -33.

--> inv(A)

ans = -0.3030303 0.0606061 0.2121212

0.3333333 0.3333333 -0.3333333

0.2121212 -0.2424242 0.1515152

**2)**

--> D= [1 2 7;8 3 1]

D = 1. 2. 7.

8. 3. 1.

--> det(D)

det: Wrong type for input argument #1: Square matrix expected.

--> inv(D)

inv: Argument 1: Square matrix expected.

**Que. 2)** Find rank by finding Reduced row echelon form of the following matrices using matrix row operations.

**1)**

--> A= [1 2 3;4 3 1;5 2 4]

A = 1. 2. 3.

4. 3. 1.

5. 2. 4.

--> rref(A)

ans = 1. 0. 0.

0. 1. 0.

0. 0. 1.

--> rank(A)

ans = 3.

**2)**

--> B= [8 6 3;7 3 5]

B = 8. 6. 3.

7. 3. 5.

--> rref(B)

ans = 1. 0. 1.1666667

0. 1. -1.0555556

--> rank(B)

ans = 2.

**Que.3)** Examine for linear dependence/ independence.

**1)**  x1 = (1, 2 ,-1, 0), x2 = (1, 3, 1, 2), x3 = (4, 2, 1, 0), x4= (6, 1, 0, 1)

--> A= [1 2 -1 0;1 3 1 2;4 2 1 0;6 1 0 1]

A = 1. 2. -1. 0.

1. 3. 1. 2.

4. 2. 1. 0.

6. 1. 0. 1.

--> rank(A)

ans = 4.

As Rank =Number of Variables, the given system is linearly independent.

**2)** x1 = (1, -1, 1), x2 = (2, 1, 1), x3=(3, 0, 2)

--> A= [1 -1 1;2 1 1;3 0 2]

A = 1. -1. 1.

2. 1. 1.

3. 0. 2.

--> rank(A)

ans = 2.

As Rank is less than Number of Variables the given system is linearly dependent.

**Scilab Assignment: 2**

**Que.1**) Solve the following systems of linear equations.

**1)** x + y=-2, y + z=1, x + z=1

--> A= [1 1 0;0 1 1;1 0 1]

A = 1. 1. 0.

0. 1. 1.

1. 0. 1.

--> B= [-2;1;1]

B = -2.

1.

1.

--> A\B

ans = -1.

-1.

2.

**2)** x + y + z=4, x – y + 2z =3, 2x + 3y - z=6

--> A= [1 1 1;1 -1 2 ;2 3 -1]

A = 1. 1. 1.

1. -1. 2.

2. 3. -1.

--> B= [4;3;6]

B = 4.

3.

6.

--> A\B

ans =2.

1.

1.

**3)** x +3y –z + 8w=13, x + y + z+ 6w =13, 3x + y + z +11w=25, 4x - 2y=6

--> A= [1 3 -1 8;1 1 1 6;3 1 1 11;4 -2 0 0]

A = 1. 3. -1. 8.

1. 1. 1. 6.

3. 1. 1. 11.

4. -2. 0. 0.

--> B= [13;13;25;6]

B = 13.

13.

25.

6.

--> A\B

ans = 1.0000000

-1.0000000

1.0000000

2.0000000

**4)** x + y + z=3 , 2x – y + 3z=1, 4x + y+ 5z=2, 3x -2y +z=4

--> A= [1 1 1;2 -1 3;4 1 5;3 -2 1]

A = 1. 1. 1.

2. -1. 3.

4. 1. 5.

3. -2. 1.

--> B= [3;1;2;4]

B = 3.

1.

2.

4.

--> A\B

ans = 2.0151515

0.4545455

-1.1363636

**Que.2)** Find the Characteristic polynomial, Eigen values and eigenvectors of the following matrices

**1)**

--> A= [0 0 0 1;0 0 1 2;0 1 2 3;1 2 3 4]

A = 0. 0. 0. 1.

0. 0. 1. 2.

0. 1. 2. 3.

1. 2. 3. 4.

--> [v,e]=spec(A)

v = 0.4589356 0.5205747 -0.7111656 0.1123542

0.6674381 -0.6806645 -0.0199182 0.3013725

0.2809054 0.493401 0.6267614 0.5336833

-0.5147782 -0.1491753 -0.3178316 0.7821338

e = -1.1216783 0. 0. 0.

0. -0.2865588 0. 0.

0. 0. 0.4469163 0.

0. 0. 0. 6.9613208

--> x=poly(0,'x')

x = x

--> p=det(x\*eye(4,4)-A)

p = 1 +2x -7x² -6x³ +1x⁴

**2)**

--> D= [3 1 3;3 4 0;1 4 2]

D = 3. 1. 3.

3. 4. 0.

1. 4. 2.

--> [v,e]=spec(D)

v = -0.5773503 + 0.i -0.2737854 - 0.5477605i -0.2737854 + 0.5477605i

-0.5773503 + 0.i -0.0864586 + 0.4833181i -0.0864586 - 0.4833181i

-0.5773503 + 0.i 0.6196197 + 0.i 0.6196197 + 0.i

e = 7. + 0.i 0. + 0.i 0. + 0.i

0. + 0.i 1. + 2.236068i 0. + 0.i

0. + 0.i 0. + 0.i 1. - 2.236068i

--> x=poly(0,'x')

x = x

--> p=det(x\*eye(3,3)-D)

p = -42 +20x -9x² +x³

**3)**

--> E= [2 0 3;0 2 0;0 0 2]

E = 2. 0. 3.

0. 2. 0.

0. 0. 2.

--> x=poly(0,'x')

x = x

--> p=det(x\*eye(3,3)-E)

p = -8 +12x -6x² +x³

--> [v,e]=spec(E)

v = 1. + 0.i 0. + 0.i -1. + 0.i

0. + 0.i 1. + 0.i 0. + 0.i

0. + 0.i 0. + 0.i 1.480D-16 + 0.i

e = 2. + 0.i 0. + 0.i 0. + 0.i

0. + 0.i 2. + 0.i 0. + 0.i

0. + 0.i 0. + 0.i 2. + 0.i

**4)**

--> F= [1 0 3;1 2 1;0 0 2]

F = 1. 0. 3.

1. 2. 1.

0. 0. 2.

--> x=poly(0,'x')

x = x

--> p=det(x\*eye(3,3)-F)

p = -4 +8x -5x² +x³

--> [v,e]=spec(F)

v = 0. + 0.i 0.7071068 + 0.i 3.331D-16 + 0.i

1. + 0.i -0.7071068 + 0.i -1. + 0.i

0. + 0.i 0. + 0.i 1.110D-16 + 0.i

e = 2. + 0.i 0. + 0.i 0. + 0.i

0. + 0.i 1. + 0.i 0. + 0.i

0. + 0.i 0. + 0.i 2. + 0.i