Lab Assignment Week 4

Ques 1

```
U = [9; 1], V = [2 -1;1 0], W = [5 -2;1 4;8 2]
```

```
U = 2×1
      9
      1
V = 2×2
      2    -1
      1     0
W = 3×2
      5    -2
      1     4
      8     2
```

```
transpose(W)
```

```
ans = 2×3
      5     1     8
     -2     4     2
```

```
V * U
```

```
ans = 2×1
     17
      9
```

```
W * V
```

```
ans = 3×2
      8    -5
      6    -1
     18    -8
```

```
inv(V)
```

```
ans = 2×2
      0     1
     -1     2
```

```
inv(V) * U
```

```
ans = 2×1
      1
     -7
```

Ques 2

```
V = [4 3 2 1],W = [5 -2 0 0],X = [2;1;0;2],A = [1,0;0,4],B = [4 1 -2;3 7 0],C = [5;8],D = [8]
```

```
V = 1×4
    4    3    2    1
W = 1×4
    5   -2    0    0
X = 4×1
    2
    1
    0
    2
A = 2×2
    1    0
    0    4
B = 2×3
    4    1   -2
    3    7    0
C = 2×1
    5
    8
D = 8
```

A*B

```
ans = 2×3
     4     1    -2
    12    28     0
```

A.*B

Arrays have incompatible sizes for this operation.

Related documentation

A*A

```
ans = 2×2
    1     0
    0    16
```

B*C

```
Error using  *
Incorrect dimensions for matrix multiplication. Check that the number of columns in the first matrix matches
the number of
rows in the second matrix. To operate on each element of the matrix individually, use TIMES (.*) for
elementwise
multiplication.
```

Related documentation

C*B

```
Error using  *
Incorrect dimensions for matrix multiplication. Check that the number of columns in the first matrix matches
the number of
rows in the second matrix. To operate on each element of the matrix individually, use TIMES (.*) for
```

```
B*D
```

```
ans = 2×3
    32     8   -16
    24    56     0
```

```
A^2
```

```
ans = 2×2
    1     0
    0    16
```

```
A.^2
```

```
ans = 2×2
    1     0
    0    16
```

```
2*V
```

```
ans = 1×4
    8     6     4     2
```

```
V*W
```

```
V/5
```

```
ans = 1×4
    0.8000    0.6000    0.4000    0.2000
```

```
V./W
```

```
ans = 1×4
    0.8000   -1.5000       Inf       Inf
```

```
W*X
```

```
ans = 8
```

```
W.*X
```

```
ans = 4×4
    10    -4     0     0
     5    -2     0     0
     0     0     0     0
    10    -4     0     0
```

```
B+C
```

```
ans = 2×3
     9     6     3
    11    15     8
```

```
W-D
```

```
ans = 1×4
    -3   -10    -8    -8
```

Ques 3

```
I4 = eye(4)
```

```
I4 = 4×4
     1     0     0     0
     0     1     0     0
     0     0     1     0
     0     0     0     1
```

```
I4(2,:) = ones
```

```
I4 = 2×4
     0     0     0    -2
     1     1     1     1
```

```
D = I4
```

```
D = 2×4
     0     0     0    -2
     1     1     1     1
```

```
I4(:,4) = -2
```

```
I4 = 2×4
     0     0     0    -2
     1     1     1    -2
```

```
D = I4
```

```
D = 2×4
     0     0     0    -2
     1     1     1    -2
```

Ques 4

Using Matrix Inverse Method

```
syms x y z
eqn1 = 5.7*x -2.3*y + 0.9*z == 30.1;
eqn2 = -2.5*x + 1.3*y + 0*z == -12.6;
eqn3 = 8.0*x + 4.2*y - 7.5*z == 1.1;
[A,B] = equationsToMatrix([eqn1,eqn2,eqn3],[x,y,z])
```

A =

$$\begin{pmatrix} \dfrac{57}{10} & -\dfrac{23}{10} & \dfrac{9}{10} \\ -\dfrac{5}{2} & \dfrac{13}{10} & 0 \\ 8 & \dfrac{21}{5} & -\dfrac{15}{2} \end{pmatrix}$$

B =

$$\begin{pmatrix} \dfrac{301}{10} \\ -\dfrac{63}{5} \\ \dfrac{11}{10} \end{pmatrix}$$

```
x = linsolve(A,B)
```

x =

$$\begin{pmatrix} 4 \\ -2 \\ 3 \end{pmatrix}$$

```
D = [A B]
```

D =

$$\begin{pmatrix} \dfrac{57}{10} & -\dfrac{23}{10} & \dfrac{9}{10} & \dfrac{301}{10} \\ -\dfrac{5}{2} & \dfrac{13}{10} & 0 & -\dfrac{63}{5} \\ 8 & \dfrac{21}{5} & -\dfrac{15}{2} & \dfrac{11}{10} \end{pmatrix}$$

Using Gausian Elimination

```
[m,n]=size(D);
for j=1:m-1
    for z=2:m
        if D(j,j)==0
            t=D(j,:);D(j,:)=D(z,:);
```

```
            D(z,:)=t;
        end
    end
    for i=j+1:m
        D(i,:)=D(i,:)-D(j,:)*(D(i,j)/D(j,j));
    end
end
x=zeros(1,m);
for s=m:-1:1
    c=0;
    for k=2:m
        c=c+D(s,k)*x(k);
    end
    x(s)=(D(s,n)-c)/D(s,s);
end
D
```

D =

$$\begin{pmatrix} \dfrac{57}{10} & -\dfrac{23}{10} & \dfrac{9}{10} & \dfrac{301}{10} \\[2mm] 0 & \dfrac{83}{285} & \dfrac{15}{38} & \dfrac{343}{570} \\[2mm] 0 & 0 & -\dfrac{1563}{83} & -\dfrac{4689}{83} \end{pmatrix}$$

```
x'
```

ans = 3×1
     4
    -2
     3

Ques 5

```
B = [1 2 3;3 4 5];
[m n]=size(B);
myTranspose=zeros(n,m);
for i=1:n
    for j=1:m
        myTranspose(i,j)=B(j, i);
    end
end
B
```

B = 2×3
     1   2   3
     3   4   5

```
myTranspose
```

myTranspose = 3×2
     1   3
     2   4

3   5