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ELEN 50 Lab

30 September 2020

Wednesday 2:15PM

Lab 1 Report: Vectors and Matrices

Part B:

```
>> A = [2,1;3,2]; >> A3 = (A' * B')'
>> B = [3,1;2,2];
>> A'
ans =
     2     3
     1     2
>> B'
ans =
     3     2
     1     2
>> A1 = A * B
A1 =
     8     4
    13     7
>> A2 = B * A
A2 =
     9     5
    10     6
```

```
A3 =
     9     5
    10     6
>> A4 = (B' * A')'
A4 =
     8     4
    13     7
>> A3 = inv(B*A)
A3 =
    1.5000   -1.2500
   -2.5000    2.2500
>> A4 = inv(B) * inv(A)
A4 =
    1.7500   -1.0000
   -3.2500    2.0000
>> A1 * (A*B)
ans =
     1     0
     0     1
>> (A*B) * A1
ans =
    1.0000   -0.0000
    0.0000    1.0000
```

Part C:

```
>> A1 = inv(A*B)
A1 =
    1.7500   -1.0000
   -3.2500    2.0000
>> A2 = inv(A) * inv(B)
A2 =
    1.5000   -1.2500
   -2.5000    2.2500
```

Part D:

```
>> C = [1 0 1; 3 3 4; 2 2 3];
>> S = [10;12;5];
>> V = C\S
```

V =

```
19.0000
-3.0000
-9.0000
```

```
>> ELEN50Lab1
```

Part E:

C =

```
[ 1/500, -1/1000, 0, -1/1000]
[ -1/500, 3/2000, 0, 1/500]
[ 0, 1, -1, 0]
[ 0, 0, -1, 1]
```

S =

```
1/125
-3/500
6
12
```

v =

```
13/3
-8/3
-26/3
10/3
```

```
>> ELEN50Lab11
```

C =

```
[ 1/1000, -1/1000, -1/1000, 1/400]
[ -1/1000, 1/1000, 1/500, -1/1000]
[ 0, -1, 1, 0]
[ -1, 0, -2, 1]
```

S =

```
1/250
-1/500
12
0
```

v =

```
-4
-10
2
0
```

```
1 - Vs = 12;
2 - %Is1 = 4mA
3 - Is1 = 4/1000;
4 - %Is2 = 2ma
5 - Is2 = 2/1000;
6 - R1 = 1e3;
7 - R2 = 1e3;
8 - R3 = 1e3;
9 - R4 = 1e3;
10 - R5 = 1e3;
11 - R6 = 1e3;
12
13 - syms Va Vb Vc Vd real
14
15 - eq1 = -Is1 + (Va-Vb)/R1 + (Vd-Vc)/R2 + Vd/R5 + Vd/(R3+R6) == 0;
16 - eq2 = (Vb-Va)/R1 + Is2 + Vc/R4 + (Vc-Vd)/R2 == 0;
17 - eq3 = Vc - Vb == Vs;
18 - eq4 = Vd - Va == 2 * Vc;
19
20 - eqns = [eq1, eq2, eq3, eq4];
21 - vars = [Va, Vb, Vc, Vd];
22
23 - [C,S] = equationsToMatrix(eqns, vars)
24
25 - v = inv(C) * S
```

```
1 - Vs1 = 6;
2 - Vs2 = 12;
3 - %Is1 = 2mA
4 - Is1 = 2/1000;
5 - %Is2 = 4mA
6 - Is2 = 4/1000;
7 - %Is3 = 6mA
8 - Is3 = 6/1000;
9 - R1 = 1e3;
10 - R2 = 1e3;
11 - R3 = 2e3;
12 - R4 = 1e3;
13
14 - syms Va Vb Vc Vd real
15
16 - eq1 = (Va-Vb)/R1 - Is1 + (Va-Vd)/R2 - Is3 == 0;
17 - eq2 = (Vb-Va)/R1 + Is1 + (Vd-Va)/R2 + Vb/R3 + Is2 + Vd/R4 == 0;
18 - eq3 = Vb - Vc == Vs1;
19 - eq4 = Vd - Vc == Vs2;
20
21 - eqns = [eq1, eq2, eq3, eq4];
22 - vars = [Va, Vb, Vc, Vd];
23
24 - [C,S] = equationsToMatrix(eqns, vars)
25
26 - v = inv(C) * S
```

Part F:

```
>> D = [2,4;1,2];  
>> D1 = inv(D)  
Warning: Matrix is singular to working precision.
```

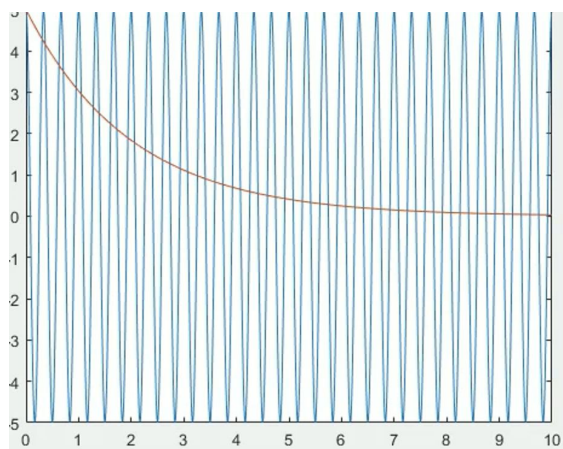
```
D1 =
```

```
Inf    Inf  
Inf    Inf
```

There is no inverse, because the determinant of the matrix is 0 so the inverse is non existent.

Part G:

```
>> t = 0:0.01:10;  
>> plot (t , 5 * cos(2 * pi * 3 * t) , t , 5 * exp (-0.5 * t))
```



```
>> p = 5 * cos(2 * pi * 3 * t);  
>> v = 5 * exp (-0.5 * t);  
>> b = p .* v
```

