

ce506 homework 1 solution  
fall 2003

\*\*\*\*\*

DATA

b =

1	1
2	1
3	1

f =

1
3
2

q =

2	1	0
1	2	1
0	1	3

a =

1	2
2	4
3	6

a2 =

1.0000	2.0000
2.0000	4.0000
3.0000	6.0001

c1 =

1	2	1
3	4	1
1	2	2

d1 =

2
1
1

c2 =

1	2	1
2	4	2
1	2	2

d2 =

3
6
7

\*\*\*\*\* 1 \*\*\*\*\*

w=inv(q)

w =

0.7143	-0.4286	0.1429
-0.4286	0.8571	-0.2857
0.1429	-0.2857	0.4286

```
***** 2 *****
```

```
n=b'*w*b
n =
    3.7143    1.5714
    1.5714    0.8571
```

```
***** 3 *****
```

```
t=b'*w*f
t =
    3.2857
    1.4286
```

```
***** 4 *****
```

```
x=inv(n)*t
x =
    0.8000
    0.2000
```

```
***** 5 *****
```

```
cond(b)
ans =
    6.7930
cond(n)
ans =
    27.2204
```

```
***** 6 *****
```

```
det(n)
ans =
    0.7143
```

```
***** 7 *****
```

```
eig(n)
ans =
    4.4094
    0.1620
eig(q)
ans =
    0.7530
    2.4450
    3.8019
```

```
***** 8 *****
```

```
svd(n)
```

```
ans =
    4.4094
    0.1620
```

```
***** 9 *****
```

```
z=inv(c1)*d1
z =
   -4.0000
    3.5000
   -1.0000
```

```
***** 10 *****
```

first two rows of c2 are multiples of each other therefore the matrix is singular (also first two columns are multiples of each other). in order to get a solution, throw away the first equation (since it is the same as the second). arbitrarily declare w(1)=0, or anything else. this reduces it to a 2x2 system of equations which can be solved in the usual way,

```
c2 =
     1     2     1
     2     4     2
     1     2     2
c3=c2(2:3,2:3)
c3 =
     4     2
     2     2
d3=d2(2:3)
d3 =
     6
     7
w3=inv(c3)*d3
w3 =
   -0.5000
    4.0000
w=[0;w3]
w =
     0
   -0.5000
    4.0000
```

demonstrate that w is a solution of the original equations

```
c2*w
ans =
     3
     6
     7
d2 =
     3
     6
     7
```

\*\*\*\*\* 11 \*\*\*\*\*

```
ata=a'*a
ata =
    14    28
    28    56
rank(ata)
ans =
    1
cond(ata)
ans =
    1.1014e+016
note: large condition number means the matrix
is singular or near singular
```

\*\*\*\*\* 12 \*\*\*\*\*

```
aat=a*a'
aat =
    5    10    15
    10   20   30
    15   30   45
rank(aat)
ans =
    1
cond(aat)
ans =
    3.2654e+031
```

\*\*\*\*\* 13 \*\*\*\*\*

```
a2ta2=a2'*a2
a2ta2 =
    14.0000    28.0003
    28.0003    56.0012
rank(a2ta2)
ans =
    2
cond(a2ta2)
ans =
    9.8002e+010
```

\*\*\*\*\* 14 \*\*\*\*\*

```
v1=random('Normal',0,1,20,1);
```

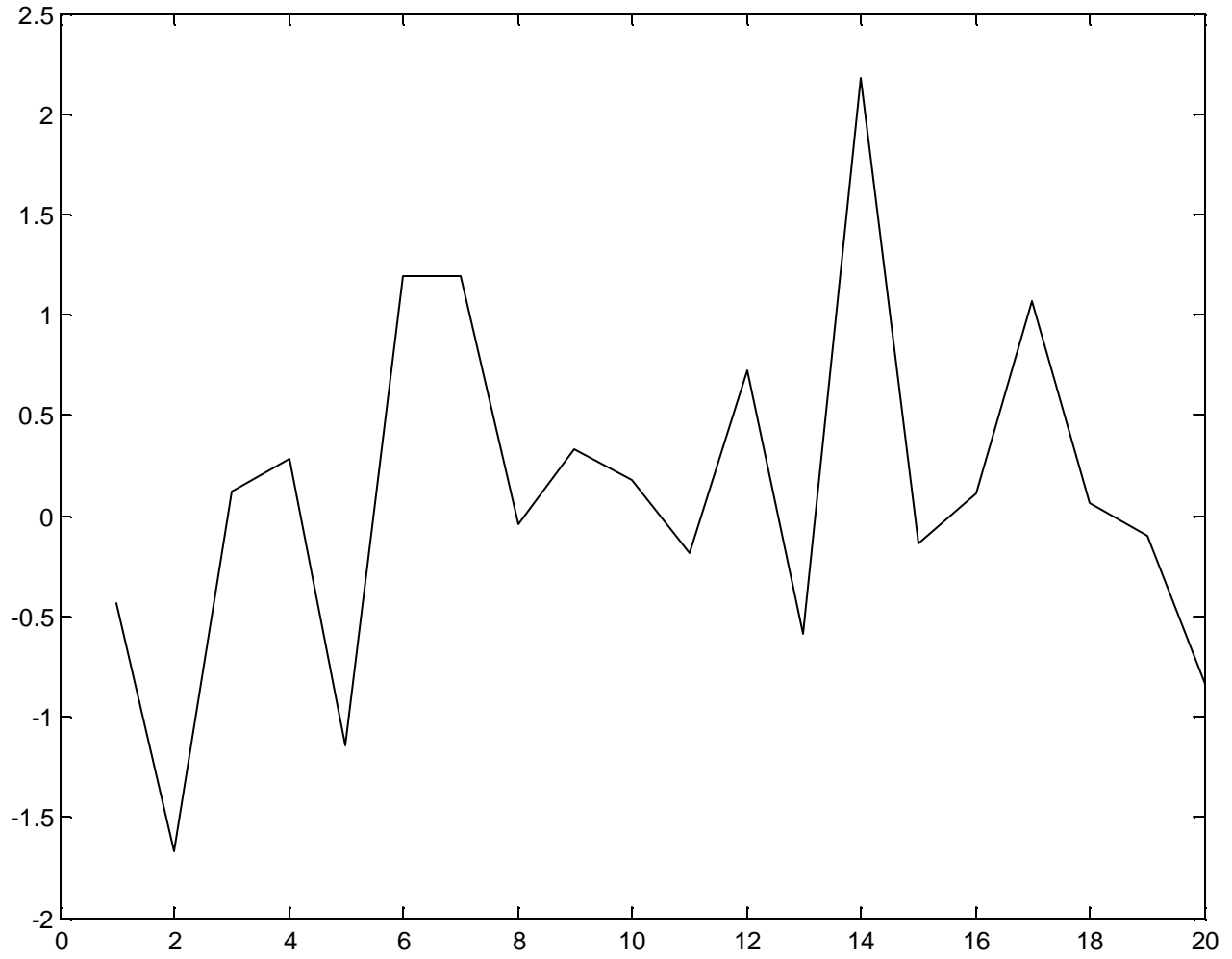
\*\*\*\*\* 15 \*\*\*\*\*

```
v2=random('Uniform',0,1,20,1);
```

\*\*\*\*\* 16 \*\*\*\*\*

```
v3=random('Normal',0,1,1000,1);  
  
***** 17 *****  
  
v4=random('Uniform',0,1,1000,1);  
  
plot(v1)  
title('20 element normal, mean 0, variance 1');  
figure(1)  
  
plot(v2)  
title('20 element uniform, 0-1');  
figure(1)  
  
hist(v3)  
title('histogram of 1000 n(0,1) rv')  
figure(1)  
  
hist(v4)  
title('historgram of 1000 u(0,1) rv')  
figure(1)
```

20 element normal, mean 0, variance 1



20 element uniform, 0-1

