Math 323
Linear Algebra and Matrix Theory I
Fall 1999

Dr. Constant J. Goutziers
Department of Mathematical Sciences
goutzicj@oneonta.edu

Key Homework 2

Strang Page 30 no: 9

a)

```
A=[1 2 4; -2 3 1; -4 1 2], x=[2; 2; 3], Ax1=A(1, : )*x, Ax2=A(2, : )*x,
Ax3=A(3, : )*x, Ax=[Ax1; Ax2; Ax3]

A =
     1     2     4
    -2     3     1
    -4     1     2
x =
     2
     2
     3
Ax1 =
    18
Ax2 =
     5
Ax3 =
     0
Ax =
    18
     5
     0
```

Strang Page 30 no: 10

```
Ax=x(1)*A(:, 1)+x(2)*A(:, 2)+x(3)*A(:, 3)

Ax =
    18
     5
     0
```

Nine seperate multiplications are required to obtain this result.

Strang Page 30 no: 11

```
A=[2 3; 5 1], x=[4; 2], Ax=A*x
```

```
A =
     2     3
     5     1
x =
     4
     2
Ax =
    14
    22
```

```
A=[3 6; 6 12], x=[2; -1], Ax=A*x
```

```
A =
     3     6
     6    12
x =
     2
    -1
Ax =
     0
     0
```

```
A=[1 2 4; 2 0 1], x=[3; 1; 1], Ax=A*x
```

```
A =
     1     2     4
     2     0     1
x =
     3
     1
     1
Ax =
     9
     7
```

Strang Page 30 no: 13

a) … a vector with n components to produce a vector with m components.
b) … are in n dimensional space. The combination of the columns of A is in m dimensional space.

Strang Page 30 no: 14

a) A linear equation in three unknowns x, y and z is given by $ax + by + cz = d$.
b) … provided $c + d = 1$.
c) … when the right side is zero.

Strang Page 30 no: 15

a)
```
I2=eye(2)
```

```
I2 =
     1     0
     0     1
```

b)

```
J2=[0 1; 1 0]

J2 =
     0     1
     1     0
```

Strang Page 30 no: 20

a)

```
P1=[1 0; 0 0], P2=[0 0; 0 1], v=[5; 7], P1v=P1*v, P2P1v=P2*P1*v

P1 =
     1     0
     0     0
P2 =
     0     0
     0     1
v =
     5
     7
P1v =
     5
     0
P2P1v =
     0
     0
```

Strang Page 30 no: 29

a)

```
A=[0.8 0.3; 0.2 0.7], u0=[1;0], u1=A*u0, u2=A*u1, u3=A*u2

A =
    0.8000    0.3000
    0.2000    0.7000
u0 =
     1
     0
u1 =
    0.8000
    0.2000
u2 =
    0.7000
    0.3000
u3 =
    0.6500
    0.3500
```

Each of the vectors has the property that the sum of its components equals 1.