```
%Raashi Maheshwari
%Last Four Numbers of RUID: 8169
%Section C1
%Math 250 MATLAB Assignment #1
rand('seed',8169)
%Question 1(a)
R = rand(2, 3)
R =
   0.9531    0.3798    0.6588
   0.6918    0.4286    0.7423
R = rand(2, 3)
R =
   0.3445    0.4270    0.6764
   0.8738    0.7102    0.5386
R = rand(2, 3)
R =
   0.8745    0.5439    0.6590
   0.9984    0.9494    0.5603
%Question 1(b)
A = [1 2; 3 4; 5 6]
A =
    1     2
    3     4
    5     6
B = [1 2 3; 4 5 6; 7 8 9]
B =
    1     2     3
    4     5     6
    7     8     9
x = [ 4 3 2]
x =
    4     3     2
X = [1; 2; 3]
X =
    1
    2
    3
A
A =
    1     2
    3     4
    5     6
B
B =
    1     2     3
    4     5     6
    7     8     9
x
x =
```

```
    4     3     2
X
X =
    1
    2
    3
whos
 Name      Size            Bytes  Class     Attributes
 A         3x2                48  double
 B         3x3                72  double
 R         2x3                48  double
 X         3x1                24  double
 x         1x3                24  double
%Question 1(c)
[size(A); size(B); size(X); size(x)]
ans =
    3     2
    3     3
    3     1
    1     3
S = ans
S =
    3     2
    3     3
    3     1
    1     3
%Question 1(d)
a32 = A(3,2)
a32 =
    6
A(3, 2) = 7
A =
    1     2
    3     4
    5     7
A(3, 2) = 6
A =
    1     2
    3     4
    5     6
%Question 1(e)
C(:,1) = B(:,1); C(:,2) = B(:,3)
C =
    1     3
    4     6
    7     9
D(1,:) = B(1,:); D(2,:) = B(3, :)
D =
    1     2     3
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```
    7     8     9
C, D
C =
    1     3
    4     6
    7     9
D =
    1     2     3
    7     8     9
%Question 2(a)
%A, B, C, X can be put side by side because they have the same number of
%rows (3 rows)
%A, C can be put on top of one another because they have the same number of
%columns (2 columns)
%B and D can be put on top of one another because they have the same number of
%columns (3 columns)
[A X]
ans =
    1     2     1
    3     4     2
    5     6     3
[B C]
ans =
    1     2     3     1     3
    4     5     6     4     6
    7     8     9     7     9
[C D]
{Error using <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('horzcat')
" style="font-weight:bold">horzcat</a>
Dimensions of arrays being concatenated are not consistent.}
[C;B]
{Error using <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('vertcat')
" style="font-weight:bold">vertcat</a>
Dimensions of arrays being concatenated are not consistent.}
[B;D]
ans =
    1     2     3
    4     5     6
    7     8     9
    1     2     3
    7     8     9
%Question 2(b)
eye(4)
ans =
    1     0     0     0
    0     1     0     0
    0     0     1     0
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```
    0     0     0     1
zeros(3)
ans =
    0     0     0
    0     0     0
    0     0     0
zeros(3,5)
ans =
    0     0     0     0     0
    0     0     0     0     0
    0     0     0     0     0
ones(2,3)
ans =
    1     1     1
    1     1     1
diag([4 5 6 7])
ans =
    4     0     0     0
    0     5     0     0
    0     0     6     0
    0     0     0     7
%Question 3
u = fix(10*rand(3,1)), v = fix(10*rand(3,1)), A = fix(10*rand(2,3)), B =
fix(10*rand(2,3))
u =
    9
    5
    8
v =
    7
    8
    4
A =
    7     0     2
    1     7     4
B =
    2     6     8
    7     2     1
%Question 3(a)
A + B
ans =
    9     6    10
    8     9     5
B + A
ans =
    9     6    10
    8     9     5
6*B
ans =
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```
   12    36    48
   42    12     6
2*(3*B)
ans =
   12    36    48
   42    12     6
6*A + 15*B
ans =
   72    90   132
  111    72    39
3*(2*A + 5 *B)
ans =
   72    90   132
  111    72    39
3*A
ans =
   21     0     6
    3    21    12
( (3*A)' )'
ans =
   21     0     6
    3    21    12
%A + B and B + A return the same matrix because of the commutative law of
matrix addition
%6B and 2(3B) return the same matrix because of Theorem 1.1, Property(e)(Page
6)which states (given s and t are any scalars and A is an m * n matrix):(st)A =
s(tA)
%6A + 15B and 3(2A + 5B) return the same matrix because of Theorem 1.1,
Property(f)(Page 6), which states (given s is any scalars and A & B are m * n
matrices): s(A + B) = sA + sB .... the only slight difference in this case is
at A and B are matrices that are being multiplied by scalars but the property
still applies
% 3A and ((3A)^T)^T return the same matrix because of Theorem 1.2,
Property9(c)(Page 7) which states (A is an m * n matrix): (A)^T)^T = A. The
transpose of a transpose is the original matrix. In this case, the only slight
difference is that A is a matrix that is being multiplied by a scalar (3)
%Question 3(b)
A*u + A*v
ans =
  136
  155
A(u + v)
ans =
  136
  155
(A + B)*u
ans =
  191
  157
```

```
A*u + B * u
ans =
  191
  157
A * (3*u)
ans =
  237
  228
3*A*(u)
ans =
  237
  228
%Au + Av and A(u + v) return the same matrix because of Theorem 1.3,
Property(a) (Page 24). The property states (given u and v are vectors in R^N
and A & B are m * n matrices): A(u + v) = Au + Av
%(A + B)u and Au + Bu return the same matrix because of Theorem 1.3,
Property(c) (Page 24). The property states (given u and v are vectors and A & B
are m * n matrices): (A + B)u = Au + Bu
%A(3u) and 3A(u) return the same matrix because of Theorem 1.3,
Property(b)(Page 24)which states (given s and t are any scalars and A is an m *
n matrix):A(cu) = c(Au) = (cA)u for every scalar c
%Question 4(a)
A = fix(10*rand(3,4))
A =
    4     2     1     0
    1     9     6     6
    0     6     8     7
R = A; R(1,:) = R(1,:)/R(1,1)
R =
   1.0000    0.5000    0.2500         0
   1.0000    9.0000    6.0000    6.0000
        0    6.0000    8.0000    7.0000
R(2,:) = R(2,:) - R(2,1)*R(1,:)
R =
   1.0000    0.5000    0.2500         0
        0    8.5000    5.7500    6.0000
        0    6.0000    8.0000    7.0000
R(3,:) = R(3,:) - R(3,1)*R(1,:)
R =
   1.0000    0.5000    0.2500         0
        0    8.5000    5.7500    6.0000
        0    6.0000    8.0000    7.0000
%Question 4(b)
R(2,:) = R(2,:)/R(2,2)
R =
   1.0000    0.5000    0.2500         0
        0    1.0000    0.6765    0.7059
        0    6.0000    8.0000    7.0000
R(1,:) = R(1,:) - R(1,2)*R(2,:)
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```
R =
   1.0000         0   -0.0882   -0.3529
        0    1.0000    0.6765    0.7059
        0    6.0000    8.0000    7.0000
R(3,:) = R(3,:) - R(3,2)*R(2,:)
R =
   1.0000         0   -0.0882   -0.3529
        0    1.0000    0.6765    0.7059
        0         0    3.9412    2.7647
%Question 4(c)
R(3,:) = R(3,:)/R(3,3)
R =
   1.0000         0   -0.0882   -0.3529
        0    1.0000    0.6765    0.7059
        0         0    1.0000    0.7015
R(2,:) = R(2,:) - R(2,3)*R(3,:)
R =
   1.0000         0   -0.0882   -0.3529
        0    1.0000         0    0.2313
        0         0    1.0000    0.7015
R(1,:) = R(1,:) - R(1,3)*R(3,:)
R =
   1.0000         0         0   -0.2910
        0    1.0000         0    0.2313
        0         0    1.0000    0.7015
%Question 4(d)
rref(A)
ans =
   1.0000         0         0   -0.2910
        0    1.0000         0    0.2313
        0         0    1.0000    0.7015
R
R =
   1.0000         0         0   -0.2910
        0    1.0000         0    0.2313
        0         0    1.0000    0.7015
%The answers match
%Question 5(a)
a = [0.1;0.15;0.30]
a =
   0.1000
   0.1500
   0.3000
m = [0.2;0.25;0.1]
m =
   0.2000
   0.2500
   0.1000
s = [0.2;0.35;0.1]
```

```
s =
   0.2000
   0.3500
   0.1000
C = [a, m, s]
C =
   0.1000    0.2000    0.2000
   0.1500    0.2500    0.3500
   0.3000    0.1000    0.1000
%Question 5(b)
x = [40; 50; 30]
x =
   40
   50
   30
x - C*x
ans =
   20
   21
   10
%The net production for the agriculture sector of the economy is $20 million
%The net production for the manufacturing sector of the economy is $21 million
%The net production for the service sector of the economy is $10 million
%Question 5(c)
%Part (i)
%For an economy with n*n input-output matrix C,
%the gross production necessary to satisfy exactly a demand d
% is a solution of: (I_n - C)x = d
d = [90; 72; 96]
d =
   90
   72
   96
i = [1 0 0; 0 1 0; 0 0 1]
i =
    1     0     0
    0     1     0
    0     0     1
i - C
ans =
   0.9000   -0.2000   -0.2000
  -0.1500    0.7500   -0.3500
  -0.3000   -0.1000    0.9000
ans(:,4) = d
ans =
   0.9000   -0.2000   -0.2000   90.0000
  -0.1500    0.7500   -0.3500   72.0000
  -0.3000   -0.1000    0.9000   96.0000
%Part (ii)
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rref(ans)
ans =
   1.0000         0         0  194.0000
        0    1.0000         0  226.5000
        0         0    1.0000  196.5000
%The gross production of the manufacturing sector of the economy to satisfy the
given demand d is $194 million
%The gross production of the agriculture sector of the economy to satisfy the
given demand d is $226.5 million
%The gross production of the service sector of the economy to satisfy the given
demand d is $196.5 million
```