```
%%Math 240 Matlab Project 2
% Spring 2020
%
% Section [0342]
%
% Author: [May Kyaw]
% Problem 1
```

(a)

```
clear
clc
close all
A = [cos(pi/5) -sin(pi/5);sin(pi/5) cos(pi/5)]
%[0.8090   -0.5878
%0.5878    0.8090]
v=[-3;3]
%v =
%    -3
%     3
A*v
```

```
A =

    1292/1597     -4456/7581
    4456/7581      1292/1597


v =

      -3
       3


ans =

   -2883/688
     819/1234
```

```
%(b)
B = [cos(pi/13) -sin(pi/13);sin(pi/13) cos(pi/13)]
%B =
%    0.9709   -0.2393
%    0.2393    0.9709
b1=A*B
%b1 =
%    0.6448   -0.7643
%    0.7643    0.6448

b2=B*A
%b2 =
```

```
%    0.6448   -0.7643
%    0.7643    0.6448


B =

     969/998      -3567/14905
    3567/14905      969/998


b1 =

    1369/2123     -1268/1659
    1268/1659      1369/2123


b2 =

    1369/2123     -1268/1659
    1268/1659      1369/2123


%(c)
% From the results we can see that both AB and BA are equal which mean
 that
% the order of the rotation does not matter becuase it will give the
 same
% results. So if we if apply rotation A then B it will be the same as
% applying rotation B then A.
%Apply A first then B
i=A*v
i=B*i
%Apply B first then A
j=B*v
j=A*j
%They both show that you would get the same results no matter what
 order
%you would put them in


i =

   -2883/688
     819/1234


i =

   -2862/677
    -581/1621


j =
```

```
    -236/65
    1543/703


j =

   -2862/677
    -581/1621
```

```
%(d)
C = A*B;
format rat
t = acos(C(1,1));
multiple = t/pi
```

```
multiple =

      18/65
```

(e)

```
format short
E = inv(A)
R5 = [cos(-pi/5) -sin(-pi/5);sin(-pi/5) cos(-pi/5)]
%From the results we are able to see that A^-1 is equal R(-pi/5).
```

```
E =

    0.8090    0.5878
   -0.5878    0.8090


R5 =

    0.8090    0.5878
   -0.5878    0.8090
```

(f)

```
L0 = [1 0;0 -1];
L5= A*L0*R5
```

```
L5 =

    0.3090    0.9511
    0.9511   -0.3090
```

(g)

```
%L = L0*L(pi/5)
L = L0*L5
%M = L(pi/5)*L0
M = L5*L0
% The composition L0*L(pi/5) is not commutative as from the results we
 are
% able to see that they are not communtative as they have diffrent
 results.
```

```
L =

    0.3090    0.9511
   -0.9511    0.3090


M =

    0.3090   -0.9511
    0.9511    0.3090
```

(h)

```
format rat
t = acos(M(1,1))
multiple = t/pi
```

```
t =

     142/113


multiple =

       2/5
```

```
%Problem 2
```

(a)

```
format rat
A = [8 1 2;1 2 2;4 1 3]
M = rref([A eye(size(A))])
```

```
A =

       8             1             2
       1             2             2
       4             1             3
```

```
M =

  Columns 1 through 5

       1               0               0              4/23
 -1/23
       0               1               0              5/23
 16/23
       0               0               1             -7/23
 -4/23

  Column 6

      -2/23
     -14/23
      15/23
```

```
%(b)
format rat
A = [8 1 2;1 2 2;4 1 3]
M = inv(A)
```

```
A =

       8               1               2
       1               2               2
       4               1               3


M =

       4/23           -1/23           -2/23
       5/23           16/23          -14/23
      -7/23           -4/23           15/23
```

```
%Problem 3
```

(a)

```
format rat
A = [6 17 0 11;0 1 4 3;0 0 -5 -1;0 0 0 2]
B = [3 3 1 -1;3 1 2 0;1 3 -1 1;0 -1 0 1]
determinantA=det(A)
determinantB=det(B)
```

```
A =

       6              17               0              11
       0               1               4               3
       0               0              -5              -1
       0               0               0               2
```

```
B =

       3             3             1            -1
       3             1             2             0
       1             3            -1             1
       0            -1             0             1


determinantA =

     -60


determinantB =

      -6


%(b)
%Yes,the determinant A could have easily been determined without
 having to
%used MATLAB this is becuase the values of the first column are mostly
%consist of zeros so we can calculate the determinant along the first
%column

%(c)
C = A*B
determinantC=det(C)


C =

      69            24            40             5
       7            10            -2             7
      -5           -14             5            -6
       0            -2             0             2


determinantC =

     360


%(d)
%Yes,the determinant C could have easily been determined without
 having to
%used MATLAB this is becuase just simply adding a mutiple of a row to
 a
%matrix to another row is not going to change the determinant.

%Problem 4
```

(a)

```
format rat
A = [-1 1 7 0; 4 0 6 -1;1 8 0 2;1 8 2 5]
det(A)
```

```
A =

      -1             1             7             0
       4             0             6            -1
       1             8             0             2
       1             8             2             5


ans =

     868
```

(b

```
%determinantB=-868
%determinantC=0
%determinantD=868
```

(c) (i)

```
format rat
B=A;
B([1 3],:)=B([3 1],:)
% (ii)
C=A;
C(4,:)=(2)*C(2,:)
%(iii)
D=A;
D(4,:)=D(4,:)-D(3,:)
```

```
B =

       1             8             0             2
       4             0             6            -1
      -1             1             7             0
       1             8             2             5


C =

      -1             1             7             0
       4             0             6            -1
       1             8             0             2
       8             0            12            -2


D =
```

```
    -1     1     7     0
     4     0     6    -1
     1     8     0     2
     0     0     2     3
```

(d)

```
format rat
determinantB=det(B)
determinantC=det(C)
determinantD=det(D)


determinantB =

    -868


determinantC =

     0


determinantD =

     868


%Problem 5
```

(a)

```
syms a b c d
A=[a b;c d]


A =

[ a, b]
[ c, d]


%(b)
M=inv(A)


M =

[  d/(a*d - b*c), -b/(a*d - b*c)]
[ -c/(a*d - b*c),  a/(a*d - b*c)]


%(c)
syms a b c d e f g h i
B=[a b c;d e f;g h i]
```

```
invB=inv(B)
```

```
B =

[ a, b, c]
[ d, e, f]
[ g, h, i]


invB =

[  (e*i - f*h)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g), -(b*i
 - c*h)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g),  (b*f - c*e)/
(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g)]
[ -(d*i - f*g)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g),  (a*i
 - c*g)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g), -(a*f - c*d)/
(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g)]
[  (d*h - e*g)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g), -(a*h
 - b*g)/(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g),  (a*e - b*d)/
(a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g)]
```

```
%(d)
detB=det(B)
detB*invB
adjB=ans
```

```
detB =

a*e*i - a*f*h - b*d*i + b*f*g + c*d*h - c*e*g


ans =

[ e*i - f*h, c*h - b*i, b*f - c*e]
[ f*g - d*i, a*i - c*g, c*d - a*f]
[ d*h - e*g, b*g - a*h, a*e - b*d]


adjB =

[ e*i - f*h, c*h - b*i, b*f - c*e]
[ f*g - d*i, a*i - c*g, c*d - a*f]
[ d*h - e*g, b*g - a*h, a*e - b*d]
```

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