```
% Homework 6
% Problem 8
% 2 x 2 matrix
cnt0 = 0;
cnt1 = 0;
cnt2 = 0;
cnt3 = 0;
cnt4 = 0;
cnt5 = 0;
cnt6 = 0;
cnt7 = 0;
cnt8 = 0;
cnt9 = 0;
for i = 1:1000
  temp = rand(2,2);
  c = cond (temp);
  if c < 10
    cnt0 = cnt0 + 1;
elseif c < 100
  cnt1 = cnt1 + 1;
elseif c < 1000
  cnt2 = cnt2 + 1;
elseif c < 10000
  cnt3 = cnt3 + 1;
elseif c < 100000
  cnt4 = cnt4 + 1;
elseif c < 1000000
  cnt5 = cnt5 + 1;
elseif c < 10000000
  cnt6 = cnt6 + 1;
elseif c < 100000000
  cnt7 = cnt7 + 1;
elseif c < 1000000000
  cnt8 = cnt8 + 1;
else
  cnt9 = cnt9 + 1;
end
end
[cnt0 cnt1 cnt2 cnt3 cnt4 cnt5 cnt6 cnt7 cnt8 cnt9]

ans =

   702   258    38     2     0     0     0     0     0     0

% 4 x 4 matrix
cnt0 = 0;
cnt1 = 0;
cnt2 = 0;
cnt3 = 0;
cnt4 = 0;
cnt5 = 0;
cnt6 = 0;
cnt7 = 0;
cnt8 = 0;
cnt9 = 0;
for i = 1:1000
  temp = rand(4,4);
  c = cond (temp);
  if c < 10
    cnt0 = cnt0 + 1;
elseif c < 100
  cnt1 = cnt1 + 1;
```

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elseif c < 1000
  cnt2 = cnt2 + 1;
elseif c < 10000
  cnt3 = cnt3 + 1;
elseif c < 100000
  cnt4 = cnt4 + 1;
elseif c < 1000000
  cnt5 = cnt5 + 1;
elseif c < 10000000
  cnt6 = cnt6 + 1;
elseif c < 100000000
  cnt7 = cnt7 + 1;
elseif c < 1000000000
  cnt8 = cnt8 + 1;
else
  cnt9 = cnt9 + 1;
end
end
[cnt0 cnt1 cnt2 cnt3 cnt4 cnt5 cnt6 cnt7 cnt8 cnt9]

ans =

   190   704    93    13     0     0     0     0     0     0

% 8 x 8 matrix
cnt0 = 0;
cnt1 = 0;
cnt2 = 0;
cnt3 = 0;
cnt4 = 0;
cnt5 = 0;
cnt6 = 0;
cnt7 = 0;
cnt8 = 0;
cnt9 = 0;
for i = 1:1000
  temp = rand(8,8);
  c = cond (temp);
  if c < 10
    cnt0 = cnt0 + 1;
elseif c < 100
  cnt1 = cnt1 + 1;
elseif c < 1000
  cnt2 = cnt2 + 1;
elseif c < 10000
  cnt3 = cnt3 + 1;
elseif c < 100000
  cnt4 = cnt4 + 1;
elseif c < 1000000
  cnt5 = cnt5 + 1;
elseif c < 10000000
  cnt6 = cnt6 + 1;
elseif c < 100000000
  cnt7 = cnt7 + 1;
elseif c < 1000000000
  cnt8 = cnt8 + 1;
else
  cnt9 = cnt9 + 1;
end
end
[cnt0 cnt1 cnt2 cnt3 cnt4 cnt5 cnt6 cnt7 cnt8 cnt9]
```

```
ans =

     0   636   321    40     2     1     0     0     0     0

% 16 x 16 matrix
cnt0 = 0;
cnt1 = 0;
cnt2 = 0;
cnt3 = 0;
cnt4 = 0;
cnt5 = 0;
cnt6 = 0;
cnt7 = 0;
cnt8 = 0;
cnt9 = 0;
for i = 1:1000
  temp = rand(16,16);
  c = cond (temp);
  if c < 10
    cnt0 = cnt0 + 1;
elseif c < 100
  cnt1 = cnt1 + 1;
elseif c < 1000
  cnt2 = cnt2 + 1;
elseif c < 10000
  cnt3 = cnt3 + 1;
elseif c < 100000
  cnt4 = cnt4 + 1;
elseif c < 1000000
  cnt5 = cnt5 + 1;
elseif c < 10000000
  cnt6 = cnt6 + 1;
elseif c < 100000000
  cnt7 = cnt7 + 1;
elseif c < 1000000000
  cnt8 = cnt8 + 1;
else
  cnt9 = cnt9 + 1;
end
end
[cnt0 cnt1 cnt2 cnt3 cnt4 cnt5 cnt6 cnt7 cnt8 cnt9]

ans =

     0   209   682    95    14     0     0     0     0     0

% 32 x 32 matrix
cnt0 = 0;
cnt1 = 0;
cnt2 = 0;
cnt3 = 0;
cnt4 = 0;
cnt5 = 0;
cnt6 = 0;
cnt7 = 0;
cnt8 = 0;
cnt9 = 0;
for i = 1:1000
  temp = rand(32,32);
  c = cond (temp);
  if c < 10
    cnt0 = cnt0 + 1;
```

```
elseif c < 100
  cnt1 = cnt1 + 1;
elseif c < 1000
  cnt2 = cnt2 + 1;
elseif c < 10000
  cnt3 = cnt3 + 1;
elseif c < 100000
  cnt4 = cnt4 + 1;
elseif c < 1000000
  cnt5 = cnt5 + 1;
elseif c < 10000000
  cnt6 = cnt6 + 1;
elseif c < 100000000
  cnt7 = cnt7 + 1;
elseif c < 1000000000
  cnt8 = cnt8 + 1;
else
  cnt9 = cnt9 + 1;
end
end
[cnt0 cnt1 cnt2 cnt3 cnt4 cnt5 cnt6 cnt7 cnt8 cnt9]

ans =

     0     0   689   281    26     4     0     0     0     0


% Problem 9
r = 40;
diskcenter = [140;160;1];
dr = 100 / 180 * pi;
carp = [140;200;1];
carv = [0;-50;0];
transc = [1 0 -140;
          0 1 -160;
          0 0 1];
rotat = [cos(dr * 0.1) -sin(dr * 0.1) 0;
         sin(dr * 0.1) cos(dr * 0.1) 0;
         0 0 1];
transcback = [1 0 140;
              0 1 160;
              0 0 1];
T = transcback * rotat * transc;
while ((carp(1,1) - 140)^2 + (carp(2,1) - 160)^2 <= r^2)
  [carp(1,1) carp(2,1)]
  carp = carp + (carv * 0.1);
  carp = T * carp;
  carv = rotat * carv;
end

ans =

   140   200


ans =

  133.9223  194.4683


ans =
```

```
  129.7394  188.1908

ans =

  127.5000  181.6506

ans =

  127.1442  175.3209

ans =

  128.5093  169.6418

ans =

  131.3397  165.0000

ans =

  135.3015  161.7101

ans =

  140.0000  160.0000

ans =

  145.0000  160.0000

ans =

  149.8481  161.7365

ans =

  154.0954  165.1303

ans =

  157.3205  170.0000

ans =

  159.1511  176.0697

ans =

  159.2836  182.9813
```

```
ans =

  157.5000  190.3109


ans =

  153.6808  197.5877


% Problem 10
% 10.a
A = [0, 1, 2, 1, 8, 1, 8;
0, 0, 1, 2, 1, 8, 1;
0, 0, 0, 1, 2, 1, 8;
1, 0, 0, 0, 1, 2, 1;
2, 1, 0, 0, 0, 1, 2;
1, 2, 1, 0, 0, 0, 1;
8, 1, 2, 1, 0, 0, 0]

A =

     0     1     2     1     8     1     8
     0     0     1     2     1     8     1
     0     0     0     1     2     1     8
     1     0     0     0     1     2     1
     2     1     0     0     0     1     2
     1     2     1     0     0     0     1
     8     1     2     1     0     0     0

det(A)

ans =

        1294
% 10.b
[L,U,P] = lu(A)

L =

    1.0000         0         0         0         0         0         0
    0.1250    1.0000         0         0         0         0         0
         0    0.5333    1.0000         0         0         0         0
         0         0    0.6250    1.0000         0         0         0
    0.2500    0.4000   -0.5000    0.2500    1.0000         0         0
         0         0         0    0.7500    1.0000    1.0000         0
    0.1250   -0.0667   -0.1250         0    0.4000   -0.5403    1.0000


U =

    8.0000    1.0000    2.0000    1.0000         0         0         0
         0    1.8750    0.7500   -0.1250         0         0    1.0000
         0         0    1.6000    1.0667    8.0000    1.0000    7.4667
         0         0         0    1.3333   -4.0000    7.3750   -3.6667
         0         0         0         0    5.0000   -0.3437    6.2500
         0         0         0         0         0   -4.1875    4.5000
         0         0         0         0         0         0    1.9313


P =
```

```
     0     0     0     0     0     0     1
     0     0     0     0     0     1     0
     1     0     0     0     0     0     0
     0     1     0     0     0     0     0
     0     0     0     0     1     0     0
     0     0     1     0     0     0     0
     0     0     0     1     0     0     0
% 10.c
det(L)

ans =

     1

det(U)

ans =

       -1294

det(P)

ans =

    -1

% 10.d
% det(L) * det(U) * det(P) = det(A)
```