Chris LaVoy
Tuesday 3:00PM

MAT 343 MATLAB Assignment #2

Question 1(a)

```
n = 1000
n =
      1000
A = floor(10*rand(n));
b = sum(A')';
z = ones(n,1);
tic, x = A\b; toc
Elapsed time is 0.297097 seconds.
tic, y = inv(A)*b; toc
Elapsed time is 0.082012 seconds.
```

The second method is faster

```
sum(abs(x-z))
ans =
  6.6424e-09
sum(abs(y-z))
ans =
  1.6206e-08
```

The second method is more accurate

Question 1(b)

```
n = 2000;
A = floor(10*rand(n));
b = sum(A')';
z = ones(n,1);
tic, x = A\b; toc
Elapsed time is 0.134847 seconds.
tic, y = inv(A)*b; toc
Elapsed time is 0.269681 seconds.
```

Method 1 was faster this time

```
sum(abs(x-z))
ans =
  1.0450e-09
sum(abs(y-z))
ans =
```

```
   7.8619e-09
```

Method 1 is more accurate

```
n = 5000;
A = floor(10*rand(n));
b = sum(A')';
z = ones(n,1);
tic, x = A\b; toc
Elapsed time is 1.371523 seconds.
tic, y = inv(A)*b; toc
Elapsed time is 3.316716 seconds.
```

Method 1 was faster

```
sum(abs(x-z))
ans =
  8.3769e-08
sum(abs(y-z))
ans =
  2.9761e-07
```

Method 1 is more accurate

Question 2(a)

```
n = 100;
A = eye(n,n) - triu(ones(n,n), 1);
sum(A')';
z = ones(n,1);
x = A\b;
y = inv(A)*b;
[_Warning: Matrix is close to singular or badly scaled. Results may be inaccurate. RCOND
=  1.577722e-32.]_
sum(abs(x-z))
ans =
    0
sum(abs(y-z))
ans =
   45
```

It appears the first method was more accurate, but there was a problem with the second command

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Question 3(a)

```
A = floor(10*rand(6));
b = floor(20*rand(6,1))-10;
x =A\b;
```

Question 3(b)

```
U = rref(A,b);
```

Question 3(c)

```
U(:,6) - x
ans =
  -3.7899
   4.7509
  -1.2734
   4.4719
  -8.9899
   5.5390
```

Question 3(d)

```
A(:,3) = A(:,1:2)*[4,3]'
A =
    0    4   12    3    8    7
    3    9   39    3    7    8
    5    3   29    4    2    4
    5    8   44    1    4    3
    3    9   39    2    5    3
    7    4   40    0    1    4
rref([A b])
ans =
    1    0    4    0    0    0    0
    0    1    3    0    0    0    0
    0    0    0    1    0    0    0
    0    0    0    0    1    0    0
    0    0    0    0    0    1    0
    0    0    0    0    0    0    1
```

Because the rows don't all start with 1, it will have infinitely many solutions

Question 3(e)

```
y = floor(20*rand(6,1)) - 10;
c = A*y;
```

It must be consistent because every row has a solution

```
U = rref([A b])
```

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```
U =
    1    0    4    0    0    0    0
    0    1    3    0    0    0    0
    0    0    0    1    0    0    0
    0    0    0    0    1    0    0
    0    0    0    0    0    1    0
    0    0    0    0    0    0    1
```

Because the rows don't all start with 1, it will have infinitely many solutions

Question 4

```
function [ y ] = myrowproduct( A, x )
[m,n]=size(A);
[p,q]=size(x);
if(q==1 && n==p)
   y=zeros(m,1);
   for i =1:m
      y(i)=A(i,:)*x;
   end
else
   disp('dimensions do not match')
   y=[];
end
```

```
>> myrowproduct(A,x)
ans =
   0.7935
   0.9349
   0.9757
   0.6519
   1.5682
>> A*x
ans =
   0.7935
   0.9349
   0.9757
   0.6519
   1.5682
```

The output is the same

Question 5(a)

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```
function [ C ] = rowproduct( A, B )
[m,n]=size(A);
[p,q]=size(B);
if(n==p)
   C = zeros(m,q);
   for i =1:m
      C(1,i) = A(i,:)*B;
   end
end
end
```

No output was available

Question 5(b)

```
function [ C ] = columnproduct( A, B )
[m,n]=size(A);
[p,q]=size(B);
if(n==p)
   C = zeros(m,q);
   for i =1:q
      C(1,i) = A*B(:,i);
   end
end
end
```