Your name: _____

        (first)   (last)

All the output for the assignment should be printed and attached to this sheet.

Question 1. Define the following matrix A and display it in Matlab.

```
A =
   1.00000   -5.00000   -4.00000
   0.00000    3.00000    4.00000
  -3.00000    6.00000    1.00000e-14
```

Here you must type `10^(-14)` to set `1.00000e-14`. And change the output format to "`short e`" by typing

```
> format short e
```

at the prompt.

(a) Construct the augmented matrix $[A\ I]$ and reduce it to REF, and find whether A is invertible (or not) by using the REF. (Before using `rref()` you may want to switch the output format to "`format short`".)

(b) Again, find whether A is invertible (or not) by using `inv(A)`.

(c) `cond(A)` will compute the condition number for a square matrix A. The larger the condition number cond(A), the closer the matrix A is to singularity. Compute the condition number for A above. Execute "`inv(A) * A`" and "`A * inv(A)`". Explain what the result indicates. Which one, (a) or (b), do you suggest to be right? Briefly justify your answer.

Question 2. Create Matlab/Octave function, `aa()`, which generates the $n \times n$ (square) matrix A whose entries are defined by

$$a_{ij} = \begin{cases} 1 & \text{if } i \geq j; \\ 0 & \text{otherwise.} \end{cases}$$

(a) First you need to decide the name for a function, say "`aa()`," and create the M file.

```
function A = aa(n)
% aa(n) creates an n-by-n matrix
for i = 1:n
  for j = 1:n
    if(i >= j)
      A(i,j) = 1;
    else
      A(i,j) = 0;
    end
  end
end
```

Then you should save it as "`aa.m`" in the current directory, allowing you to call it by "`aa()`."

```
aa(6)
B = aa(6)
```

displays the 6×6 square matrix, or stores the result in a new matrix `B`.

(b) Create the square matrix A from `aa()` for $n = 4, 6$, and calculate the inverse matrix A^{-1}. Guess the form of A^{-1}, and create the second function, `bb()`, which generates A^{-1}.

Programming Note. The if-else statement can be used as in the following example.

```
if(i == j)
  disp ('i is equal to j');
elseif(i == j+1)
  disp ('i is equal to j+1');
else
  disp ('i is neither j nor j+1');
end
```

(c) Test the function `bb()`. Generate the respective square matrices A and B from `aa()` and `bb()`, and verify $AB = I$ and $BA = I$ for $n = 8, 10$ by computing AB and BA.