EE2030 Linear Algebra
1st Computer Exercise: **Determining the rank of a matrix**
Due Tuesday Nov. 25, 2014

Brought to you by Yi-Wen Liu, Ph.D.

(a) Write a function `r = myRank(A)` that takes a random unknown matrix `A` and returns its rank `r`. You may need to write sub-functions for elementary matrix operations (such as to swap two rows or two columns). Below is an example of swapping two rows of the matrix A:

```
A([j k],:) = A([k j],:);
```

(b) Download `LinAlg2013Ex1.mat` from LMS. Type

```
load LinAlg2013Ex1.mat
```

at the command line, and then `whos` to see what's inside. You will find a few random matrices. Determine the rank of these matrices. Verify your answers against the answers given by MATLAB's function `rank()`.

Remarks:

- 評分方式：我會另外湊出幾個 《秩》已知的矩陣，並且請助教跑你們的 function, 若是全對，則本次作業滿分。
- 若有瑕疵但準時交上，則也會斟酌給予分數。請勿遲交。
- Please do not use advanced MATLAB functions, such as `eig(), svd()`.
  - 其實你們可以在 command line 鍵入 `type rank,` 則 MATLAB 就會顯示 `rank()`這個函式的寫法：

```
%
%  RANK(A) provides an estimate of the number of
%  linearly independent rows or columns of  matrix A.

s = svd(A);
if nargin==1
   tol = max(size(A)) * eps(max(s));
end
r = sum(s > tol);
```

  其中會發現使用到 Singular Value Decomposition (SVD), 這是課本第六章的內容，目前對於我們還太超過。所以還是請你們使用 elementary matrix operations 來解題。

- 鼓勵互相討論，鼓勵隨時發問，可以互相參考，但請勿抄襲。
  - 不得已要抄襲的話，請確定抄到正解。
  - ［醜話在先］如果經助教發現程式有錯誤卻讓別人抄襲，我們將找你喝下午茶，並給予被抄者與抄襲者同等處罰。
- 本次作業無須繳交紙本。請於 `LMS` 上傳你的 `.m` 檔，並請命名為 `myRank_[學號].m.` 例如：學號為 `102060789` 者，請將檔案命名為 `myRank_102060789.m,` 以方便助教半自動批改。