Exercise 1

Create the vector **a** = [0.84 0.56 0.95 0.74 0.63]
These are the accuracies of 5 participants from your experiment on a scale from 0 to 1.
You are required to:

1) Create the vector **a_perc** with the accuracies scaled from 0 to 100
2) Use **a_perc** to add an extra 5 points to all participants because of a mistake in the original script you used to calculate the accuracies
3) Get the average accuracy of your participants using vector multiplication
   Hint: This requires two steps
   (1) sum all elements of your vector: multiply an all ones vector with your vector
   (2) divide the sum by the number of participants
   MATLAB has built-in functions to do the first step **sum(),** or both steps in one go **mean()**. You may use the latter to double check your result

Exercise 2

Create the matrix acc_pre by typing acc_pre = randi([70 85],5,5).

Create the matrix acc_post by typing acc_post = randi([80 100],5,5).

These lines of code will create two 5x5 matrices with random numbers.

Let's assume that, for each matrix, each row represents a subject, and each column represents their performance on 5 different tasks. acc_pre represents their scores on the 5 tasks before they undertook your new cognitive training regimen. acc_post are their scores on the 5 tasks after training.

1) create a new matrix **acc_diff** by subtracting acc_pre from acc_post
2) Transpose **acc_diff** so that each column represents each subject's scores
3) You are informed that you need to exclude the scores of the fifth subject because it turns out they did not fit the eligibility criteria for your study. Create a new matrix **acc_diff** after excluding the 5^{th} subject (5^{th} column)
4) Average the scores differences for the remaining 4 subjects for each task separately. Hint: you can use the function **mean().** Are all of the averaged scores positive?

Exercise 3

```
A = [1 2 0; 2 5 -1; 4 10 -1]
b = [1;3;5]
```

Use the matrix A to solve the equation, A*x = b.

Exercise 4

Create the matrix **eeg_pow** = rand(3,100). (don't forget to end this line with ; so it doesn't print the output in the command line). This will create a 3x100 matrix with random numbers. Each row represents a different eeg channel, and the columns represents gamma power changes during a 200 ms period (each timepoint is sampled every 2 ms).

1) You need to subtract the baseline power from the timeseries. The baseline power for the channels are **base_pow** = [0.15 0.23 0.33] (i.e. ch1 baseline is 0.15, ch2 is 0.23 and ch3 is 0.33). Use this vector to subtract the baseline power for the relevant channel from each timepoint.
   One way to do this is to convert the vector **base_pow** into a matrix of the same size as **eeg_pow**, and then subtract it from **eeg_pow.**
   Hint: Use the function **repmat** to create multiple copies of the vector.
2) You are interested in the power in a specific time window (40-80 ms). Extract the average power for this time window for each channel.
   Hint: first create a new matrix of the time points that correspond to this time window, then average them using **mean().** Don't forget to transform the time window from ms to timepoints!

Exercise 5: some useful functions

1) Type **A = eye(5)** (what do we call this kind of matrix?)
2) Type **B = magic(5)**
3) type **[r,c] = size(B)** what do **r** and **c** represent
4) Can you get the diagonal of **B** using the matrix **A**? (another useful function to get the diagonal of a matrix is **diag**)

Useful tutorial to learn MATLAB 'google: MATLAB for psychologists' or just go to http://www.antoniahamilton.com/matlab_for_psychologists.pdf

Best way to learn is to play with your own data!