MATLAB 101
Homework #2, June 27, 2014

Remember doc and google for help, and start early!

Concepts:

1. Why use a for loop, and why a while loop?
2. When would you want to use a conditional? Give an example.
3. Why should you use a function? What is their purpose?
4. What are the three control structures that allow you to implement ANY algorithm?

Warm up:

5. Make a for loop that outputs the even numbers from 1 to 10, one at a time.
6. Make a function for problem 5, but function takes an argument for the max number. Ie, you should be able to call the function showEvens(1000), and it will show all even to 1000
7. Make the function like 6, but using a while instead of a for loop. (Hint: initialize a counter variable, x = 0; Increment it inside the loop; condition to end loop on the value of counter variable). Which type of loop was more straightforward to implement (questions 6 or 7)?
8. Write a function 'studentPassed' that takes a numerical grade in [0,1] as an argument, and returns True or false depending on if they passed. If they receive a grade of more than 95%, display 'Super excite, such wow!" to the screen. (Hint: you may want to nest a conditional inside of another conditional)

Test your might:

9. Make a function that creates a random (1 x 1000) matrix of 1000 grades in the range [0,1] (Hint: doc rand). Then loop through the values of each entry, and calls the function studentPassed on the value. Store the True/False result in another (1 x 1000) matrix, and returns that True/False matrix.
10. Make a function that takes the True/False (1 x 1000) matrix of pass values, and returns the percentage of students who passed.
11. Make a program that first does steps 9 and 10 (preferably using the nice functions you defined). Then make a while loop that will continue to run steps 9 and 10 until at least 70% of students passed. Make a counter so that the while loop will run at most 100 times. (Hint: doc break) How many times did the loop run?
12. Make a function that checks if two strings are the same, and returns True if they are the same or false otherwise. Do not use strcmp function. Compare the individual string entries. (Hint: doc length, doc break)
13. Make a function that counts all multiples of 17 below 1000000. ie, 17, 2*17, 3*17, …
14. Write a factorial function for any positive integer N. ie, N*(N-1)*(N-2)* … * 1. Check to make sure that the input is positive.

Too easy? Optional Homework++:

+1. Do HW+ from homework 1

+2. Implement the binary search algorithm for finding the root of an increasing linear function. So for a function defined by y = m*x + b, with m>0, and some y intercept b, the line will cross the x axis at some x value (the root). If you consider some very large range of x, you can search for the root by iteratively splitting the range in half according to whether the value of the y at x is > or < 0.