Midterm 1 Review

These questions are designed to help you think about course material, not to show you actual exam questions. The exam will be a mix of multiple choice, short answer and coding.

Research shows that the best way to study for an exam is with other people. In group study, the people who start knowing more learn more (think about why), so don't think that it is only valuable to study with people who know more than you do.

- 1. What are the differences between a script and a function? Both are stored in M-files. Why have both?
 - (a) Which can change command line variables?
 - (b) Which has local variables whose use doesn't affect other Matlab variables?
 - (c) Which must be passed parameters if its use depends on external values?
 - (d) Which can be evaluated as an expression to yield a value?
- 2. There are important differences between values that are printed and output values. Consider the following function definitions, and assume they are in three different M-files:

```
function [] = f(x)
  disp(x);
end
function result = g(x)
  result = 4*x;
end
function output = h(x)
  result = 5*x;
end
```

Which of the following function calls will run correctly?

```
(a) >> f(1)
(b) >> g(1)
(c) >> h(1)
(d) >> x = f(1)
(e) >> x = g(1)
(f) >> x = h(1)
(g) >> fprintf('%f', f(1))
(h) >> fprintf('%f', h(1))
(i) >> disp(g(1))
(j) >> disp(h(1))
```

3. Give three reasons why it is good practice to decompose a task into lots of small functions, rather than writing a few long functions?

- 4. What are the steps, in order, in the software design process? (Chapman Figure 3.1 p. 89)
- 5. What is "Unit testing"?
- 6. Assume that you have two directories inside your home directory, lab01 and lab02. If lab02 is your current directory at the start of each of the following questions, show how to use a single Unix shell command to:
 - (a) change your current directory to your home directory
 - (b) make lab01 your current directory
 - (c) copy file mandarin.txt from lab01 to lab02
 - (d) move file mandarin.txt from lab02 to lab01
 - (e) change the name of mandarin.txt in lab02 to valencia.txt
 - (f) list the files in lab02
 - (g) delete the file marmite.txt from lab02
 - (h) display the name of the current directory
 - (i) show all .m files in the current directory
 - (j) change in to your home directory and create a directory for lab03 (you may use two commands for this one).
- 7. Find the bug in a program similar to one you wrote for lab (to do this, get a study mate to put a bug in three M-files, and you do the same for them, then swap papers).
- 8. Given a test script, write the function that it is supposed to test.
- 9. Given a function, write a test script for it.
- 10. Given a function, show how to use it from the command line.
- 11. Write the format specifier that goes in the blank below:

fprintf('The answer is: ____', 12.123);

so that it will print the following exactly (there are seven spaces):

The answer is: 12.123

- 12. Given a function that you wrote in lab that has a missing line or section of code, fill in the missing code.
- 13. Evaluate relational and logical expressions as Matlab does:
 - (a) 4 < 2 & 9 > 7
 - (b) $(8! = 8) \mid 1$
 - (c) !(1 & 1 | 0)
 - (d) 4 & 3 < 2
- 14. Write an if statement that prints "booyah" if a number is between 12 and 17, inclusive.

- 15. Write code that prints "blue" for numbers less than 5, "green" for numbers from 5 to 10 inclusive, and "red" for numbers higher than 10.
- 16. Write a recursive function to match a recursive definition (e.g. Newton's approximation, factorial, fibonacci sequence).
- 17. Given a recursive function with an error, fix it.
- 18. Write a function that behaves as described in problem 15.
- 19. Write a for loop to display the even numbers from 0 to 10.
- 20. Write a for loop to count the number of sevens in a matrix x.
- 21. Write a for loop to change each seven in a matrix x to an 3.
- 22. Write a for loop to sum the elements in a matrix x.
- 23. In a diary demonstrate all the following:
 - (a) Create a row vector (1xn vector) called "a" with the even numbers from 0-6, inclusive, by specifying an interval.
 - (b) Show how to extract the number 4 from a
 - (c) Set "b" to the transpose of a (i.e. b will be a column)
 - (d) Show how to change the 4 in b to a 7;
 - (e) Use a for loop to display each member of b.
 - (f) Create a matrix "c" with three rows and four columns, with consecutive integers starting at 1 in the first row, 5 in the second row, 9 in the third.
 - (g) Set the 10 in c to 10.5
- 24. Make a 2x3 matrix of zeros without typing any zeros. (Chapman Table 2.1)
- 25. Make an array of ones the same dimensions as a given matrix. (Chapman Table 2.1)
- 26. Given some data in matrices, show how to plot it using the plot function.
- 27. Write by hand every program in your labs. Then compare it to your working code and see what is different; re-write until your hand-written code is aesthetically pleasing as well as functional. Remember, you will have to write code by hand on the exam; practice, and don't forget to indent.
- 28. How do we handle testing the output of functions when there may be slight differences in the precision of the answers? (Lab 4, comparing if two tax amounts are equal.)