

CISC 106 Spring 2009 Final Exam Review

These questions are designed to help you think about course material, not to show you actual exam questions. The exam will be about 40-60 percent multiple choice. The remainder will be short answer or coding. The majority of the test will pertain to Matlab, but there will be a few questions on C++. 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, so don't think that it is only valuable to study with people who know more than you do.

1. What is the difference between the way Matlab functions handle matrix parameters and the way C++ programs handle array parameters? Hint: you cannot write selection sort in Matlab the same way we wrote it in C++ because of this difference. The Matlab version would need an output variable. Why? What would it be?
2. Trace the values of an array that get changed in the loop through several iterations of the loop. Try a doubly nested loop.
3. Given a description of a function from the project, write the function. Alternatively, fill in the missing code from a version one of your study group members have written.
4. Given a vector, trace through two passes of selection sort and show what the vector would look like after the two passes.
5. Given an algorithm resembling binary search or selection sort, show the sequence of calls/parameters that will be generated.
6. Given a vector $m = [1\ 4\ 6\ 7\ 3\ 9]$, give a Matlab expression that will evaluate to m with 7 removed.
7. Write a function that will remove a number from a vector. The number and vector are parameters.
8. Given a recursive or iterative function, show what it displays when passed certain parameters.
9. Write a recursive function to calculate a simple numeric function, like factorial or exponent. Write it in C++ or in Matlab. **Note: there will be several questions on using recursion in Matlab on the test.**
10. Write a function that will return true if two numeric matrices are equal, and false if they are not.

11. Suppose you are in your home directory. How would you change the permissions of a file, spam.jpeg, that is in your cisc106 web directory so that the file can be seen on the web by everyone? (Hint: do it to see if you are correct.)
12. Given a Matlab program with a simple for loop, translate it into a C++ program, and vice-versa.
13. Given a simple recursive Matlab program, translate it into a C++ program, and vice-versa.
14. Compose a Matlab string from various smaller strings and numbers.
15. Create, and access the fields of, structures in Matlab.
16. Explain what a compiler does, what an interpreter does, and why we have both.
17. Show how to compile a C++ program so that the executable file has a name other than a.out.
18. Given some data in matrices, show how to plot it using the plot function.
19. Show how to use the Matlab functions length() and size() to help write for loops for a matrix of any size. When do we use length, and when do we use size?
20. Demonstrate traversing a matrix using an index in Matlab. Demonstrate using an index in C++ to access an array.
21. Show how to extract the vector [2 3] from the vector [1 2 3 4 5]
22. Show how to extract the matrix [2 3; 6 7] from the matrix [1 2 3 4; 5 6 7 8]
23. Show how to extract the matrix [2 3; 6 7] from the matrix [2 2 2 2; 1 2 3 4; 5 6 7 8; 9 9 9 9]
24. Demonstrate the use of the keyword "end" inside a matrix reference.
25. What are the differences between a script and a function? Both are stored in M-files. Why have both?
 - (a) Which has local variables whose use does not affect other Matlab variables?
 - (b) Which must be passed parameters if its use depends on external values?
 - (c) Which can be evaluated as an expression to yield a value?

26. 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 = 2*x;
end
```

```
function output = h(x)
    result = 3*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))

27. 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) make home your current directory
- (b) make lab01 your current directory
- (c) copy file spam.txt from lab01 to lab02
- (d) move file spam.txt from lab02 to lab01
- (e) change the name of spam.txt in lab02 to vegemite.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).

28. Find the bug in a program (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).
29. Given a test script, write the function that it is supposed to test.
30. Given a function, write a test script for it (on the exam, you would be expected to identify boundary cases without a reminder).
31. Given a function, show how to use it from the command line.
32. Identify the Matlab commands that read your function comments, and which lines they read.
33. 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
34. Given a function that you wrote in a lab that has a missing line or section of code, fill in the missing code.
35. Evaluate relational and logical expressions as Matlab does:
(a) $4 < 5 \ \& \ 6 > 7$
(b) $(5 \neq 5) \mid 1$
(c) $!(1 \ \& \ 1 \mid 0)$
(d) $4 \ \& \ 3 < 2$
36. Write an if statement that prints "boo" if a number is between 12 and 17, inclusive.
37. Write code that prints "blue" for numbers less than 5, "green" for numbers from 5 to 10 inclusive, and "mauve" for numbers higher than 10.
38. Write a recursive function to match a recursive definition.
39. Given a recursive function with an error, fix it.
40. Write a for loop to display the even numbers from 0 to 10.
41. Write a for loop to count the number of sevens in a matrix x.
42. Write a for loop to change each seven in a matrix x to an 8.
43. Write a for loop to sum the elements in a matrix x.
44. Write a for loop to get user input to fill the elements in a matrix x.