

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 30 percent multiple choice, as discussed in class. The remainder will be short answer or 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, so don't think that it is only valuable to study with people who know more than you do.

1. Given a description of a function from the project, write the function. Alternatively, fill in the missing code from a version I have written.
2. Calculate the approximate number of comparisons required by selection sort to find an element in a vector of a given length.
3. Given a vector, show what it would look like after two passes of selection sort.
4. Calculate remainders in Matlab.
5. Calculate the maximum number of comparisons required by binary search to find an element in a vector.
6. Given an algorithm resembling binary search, selection sort, or merge sort and show the sequence of calls/parameters that will be generated.
7. Given a vector $m = [1\ 4\ 6\ 7\ 3\ 9]$, give a Matlab expression that will evaluate to m with 7 removed.
8. Write a function that will remove a number from a vector. The number and vector are parameters.
9. Write a recursive and an iterative function to display a triangle of asterisks.
10. Given a recursive or iterative function, show what it displays when passed certain parameters. For example, you could be given a function that makes a geometric shape.
11. Write a recursive function to calculate a simple numeric function, like factorial or exponent.
12. Write a function that will return true if two numeric matrices are equal, and false if they are not. It should never have an error given numeric matrix parameters.
13. Use the find command to determine the position of values you wish to find in a vector.
14. Show what the find function would return when called on a vector or matrix.
15. ASCII stuff: What is the integer which corresponds to 'A'? Show a loop that will print the alphabet in Matlab.
16. 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.)
17. Given a Matlab program with a simple for loop, translate it into a recursive function and vice-versa.
18. Compose a Matlab string from various smaller strings and numbers.

19. Demonstrate the use of the Matlab “patch” function.
20. Given a call to patch, show what it would produce on an existing figure.
21. Show how to use patch to put a shape in a figure.
22. Create, and access the fields of, structures as we did in Matlab.
23. Explain what a compiler does, what an interpreter does, and why we have both.
24. Write a script to compare the time the cpu spends performing two functions 100 times each. Do not plot the data, just report the times.
25. Given some data in matrices, show how to plot it using the plot function.
26. Show how to grow a Matlab matrix.
27. Show how to use the Matlab functions length() and size() to help write for loops for a matrix of any size.
28. Demonstrate traversing the values of a matrix and traversing a matrix using an index in Matlab. Draw the order of access to matrix elements.
29. Show how to extract the vector [2 3] from the vector [1 2 3 4 5]
30. Show how to extract the matrix [2 3; 6 7] from the matrix [1 2 3 4; 5 6 7 8]
31. 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]
32. Given a matrix and an ordering of the squares in the matrix, write a for loop that will walk through the squares in that order.
33. Demonstrate the use of the keyword “end” inside a matrix reference.
34. 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?
35. 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))`

36. 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).

37. 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).

38. Given a test script, write the function that it is supposed to test.

39. Given a function, write a test script for it (on the exam, you would be expected to identify boundary cases without a reminder).

40. 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
```
41. Given a function that you wrote in lab that has a missing line or section of code, fill in the missing code.
42. Evaluate relational and logical expressions as Matlab does:
- (a) $4 < 5 \ \& \ 6 > 7$
 - (b) $(5! = 5) \mid 1$
 - (c) $!(1 \ \& \ 1 \mid 0)$
 - (d) $4 \ \& \ 3 < 2$
43. Write an if statement that prints “boo” if a number is between 12 and 17, inclusive.
44. 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.
45. Given a recursive function with an error, fix it.
46. Write a for loop to display the even numbers from 0 to 10.
47. Write a for loop to count the number of sevens in a matrix x.
48. Write a for loop to change each seven in a matrix x to an 8.
49. Write a for loop to sum the elements in a matrix x.
50. Write a for loop to get user input to fill the elements in a matrix x.
51. Make a 2x3 matrix of zeros without typing any zeros.
52. Make an array of ones the same dimensions as the matrix x.
53. Write a function that takes another function as an argument.
54. Given a simple GUI program, draw a picture of what is displayed.
55. Given a simple GUI program, write the output from successive button clicks.
56. Given a simple GUI program, create a loop that animates a patch square.