Midterm 2 Review Fall09

These questions are designed to help you think about course material, not to show you actual exam questions. The exam will be about 40-70 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.

When studying, always take the time to **explain** why an answer is correct. This will help you solidify your knowledge.

0.0.1   Project

1. Given a description of any function from the first project, show how to create test parameters and use them in a call to the function.

2. Given a description of any function from the basic project and sample input, show how to call the function and show its output (if any).

3. Show how to draw a circle using the rectangle function with radius 5 and center at 10,10.

4. Show how to reflect a circle by changing its x and y velocities.

5. Write a function that tests if a circle is at the right edge of a board.

6. Given an additional feature request, write the function definitions and contract/description/examples (not the actual code) to implement this feature.

7. Given a large function with 10+ lines of code, decompose it into multiple functions.

8. Given an animation loop, find the error that prevents the animation from displaying correctly.

0.0.2   Search and Sorting

9. What are the differences between linear and binary search?

10. Given an algorithm resembling binary search show the sequence of calls/parameters that will be generated.

11. Given a small unsorted array, explain/draw how selection sort will turn it into a sorted array (for example show the comparisons and swaps for [4 5 3 1])

12. What are the advantages of using quick sort over selection sort? Describe how quick sort works using a recursive function.

13. Think about how selection sort and quick sort work. Imagine that you had a hundred people, and you wanted to sort them by their last name. Which sort would be easier to implement if there was leader controlling the group, but each person could act on their own. Explain/defend your answer.

0.0.3 MATLAB functions/programming

14. Convert a simple function with a loop to its vectorized form.

15. Use the find command to determine the position of a value you wish to find in a vector.

16. Show what the find function would return when called on a vector or matrix. For example, what would find([0 1 2 3]) return?

17. Given a vector m = [1 4 6 7 3 9], give a Matlab expression that will evaluate to m with 7 removed.

18. Write a single statement that will remove all numbers less than 6 from a vector.

19. Explain the difference in memory usage between Matlab's default representation of numbers and the representation of a mask.

20. Demonstrate the use of Matlab functions **any, all**.

21.

22. Write a recursive and an iterative function to display a triangle of asterisks:

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23. Given a recursive function, show what it displays when passed certain parameters (trace the function as on Midterm 1). For example, you could be given a function that makes a geometric shape.

24. Write a recursive function to calculate a simple numeric function, like factorial or exponent.

25. Create, and access the fields of a structure.

26. Create an array of a structures.

27. Sum all of the values of a field in an array of a structures (for example all of the credits taken by an array of student structures).

28. Write a script to compare the time the cpu spends performing two functions 100 times each. Do not plot the data, just display the times.

29. Given some data in matrices, show how to plot it using the plot function.

30. Show how to grow a Matlab matrix. In general, is this a good idea? Why or why not?

31. Show how to use the Matlab function size() to help write for loops for a matrix of any size.

32. Given a for loop that traverses a matrix, show the order of the squares that are visited.