



Arab Academy for Science & Technology and Maritime Transport (AASTMT)

College of Computing and Information Technology (CCIT)

Computing Alg. CS312 – Spring 2014

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Q1.

- a. Write pseudocode for a divide-and-conquer algorithm for finding the position of the largest element in an array of n numbers.
- b. What will be your algorithm's output for arrays with several elements of the largest value?
- c. Setup and solve a recurrence relation for the number of key comparisons made by your algorithm.
- d. How does this algorithm compare with the brute-force algorithm for this problem?

Hint: In more than one respect, this question is similar to the divide-and-conquer computation of the sum of n numbers.

Q2.

- a. **The Dutch national flag problem is to rearrange an array of characters R , W , and B (red, white, and blue are the colors of the Dutch national flag) so that all the R 's come first, the W 's come next, and the B 's come last. Design a linear in-place algorithm for this problem.**
- b. **Explain how a solution to the Dutch national flag problem can be used in quicksort.**

Hint:

1. a. You may want to solve first the two-color flag problem, i.e., rearrange efficiently an array of R 's and B 's. (A similar problem is Problem 8 in this section's exercises.)
b. Extend the definition of a partition.