

Name_____

Worked with_____

Here are 3 problems. For each problem, sketch out a solution. In the sketch answer the following questions:

1. what data structures and variables would you use
 2. what input/output needs to be performed (if any)?
 3. Write an english (not code) description of your algorithm.
- a. Given a sequential file that contains at most four billion 32-bit integers in random order, find a 32-bit integer that isn't in the file. How would you solve the problem if you had ample amounts of main memory? How would you solve the problem if you could use several external "scratch" files, but only a few hundred bytes of main memory? (Are you sure there must be a 32-bit integer that is not in the file? Why?)

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- b. Rotate a one dimensional vector of n elements to the left by i positions. This can be done with simple code using an n -element intermediate vector to do the job in n steps. Can you rotate the vector in time proportional to n using just a few dozen extra bytes of storage?

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- c. Given a dictionary of English words, find all sets of anagrams. (i.e. valid words in the dictionary that use the exact same letters in a different order.)