Quiz 2

Data Structures Lab (CS 210)

2012

Q1. Consider a set S of n integers $\{1, 2, \ldots, n\}$. We remove an integer from this set, randomly permute the remaining set and send the elements of this permutation one by one as the input to a program to identify the missing integer. Write the C/C++ code of an *in-place algorithm* to identify the missing integer in $\Theta(n)$ time. Note that you are only allowed to create a constant number of variables in your program. In particular, you are not allowed to store the input elements in an array.

[A total of 5 marks will be awarded if and only if your program satisfies the time and space complexity mentioned above.]

Input: A sequence of distinct integers separated by space, such that the sequence satisfies the property that it's a permutation of $\{1, 2, \ldots, n\} \setminus \{i\}$ for some $1 \leq i \leq n$.

Output: The missing integer.

Q2. Consider a set S of n integers $\{1, 2, \ldots, n\}$. We remove two integers from this set, randomly permute the remaining set and send the elements of this permutation one by one as the input to a program to identify the missing integers. Write the C/C++ code of an *in-place algorithm* to identify the missing integers in $\Theta(n)$ time. Note that you are only allowed to create a constant number of variables in your program. In particular, you are not allowed to store the input elements in an array.

[A total of 5 marks will be awarded if and only if your program satisfies the time and space complexity mentioned above.]

Input: A sequence of distinct integers separated by space, such that the sequence satisfies the property that it's a permutation of $\{1, 2, \ldots, n\} \setminus \{i, j\}$ for some $1 \leq i, j \leq n, i \neq j$.

Output: The missing integers.