

# CS 14 - Summer 2003 - Quiz 2

July 6, 2003

## 1 True/False

*Circle T or F as appropriate. Running-time questions are all in terms of input size  $n$*

1. **T F** Bubble-sort has a worst case of  $O(nlgn)$
2. **T F** Selection-sort has a worst case of  $O(n^2)$
3. **T F** Intelligently adding a  $O(n)$  check to see if the list is sorted during an  $O(n^2)$  sort makes it  $O(n^3)$
4. **T F** Quick-sort has a worst case of  $O(nlgn)$
5. **T F** Quick-sort can be done without allocating any significant additional storage (“in place”)
6. **T F** A binary tree of  $n$  nodes has a best case height of  $O(\lg_2 n)$
7. **T F** A filesystem (files, directories/folders) is an example of a tree hierarchy
8. **T F** A binary search tree allows the search operation to be performed in  $O(nlgn)$

## 2 Multiple Choice

*Circle the letter of the correct answer. Running-time questions are all in terms of input size  $n$*

1. For a binary search tree, which of the following can be implemented in  $O(1)$ 
  - (a) Size
  - (b) Insert
  - (c) Max
  - (d) isEmpty



3. Describe in English the algorithm for Selection-sort.

4. What algorithm is this?

```
void mysteryAlg(vector<int>& a, int l, int h)
{
    if (l >= h) return;
    int mid = a[l];
    int lastS1 = l;
    int lUnknown = l + 1;
    while (lUnknown <= h)
    {
        if (a[lUnknown] < mid)
        {
            lastS1++;
            swap(a[lUnknown], a[lastS1]);
        }
        lUnknown++;
    }
    swap(a[l], a[lastS1]);
    mysteryAlg(a, l, lastS1 - 1);
    mysteryAlg(a, lastS1 + 1, h);
}
```