

Give the asymptotic time complexity for the following function:

```
int quiz3(vector<int>& val) {  
2   sort(val.begin(), val.end());  
   int total = 0;  
4   for(int i=val.size()/2; i<val.size(); i++) {  
       total+=val[i];  
6   }  
   return total;  
8 }
```

You may assume that the time complexity for the `sort` function is  $O(m \log m)$  and the time complexity for the `size` function is  $O(n)$  where  $m$  is the number of entries between `begin` and `end` and  $n$  is the size of the vector. Note: in this case,  $n = m$ .

Quiz 4



Name:

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Using composition, write the header file for an adaptor class for the stack data structure that uses a list of `ints` as the default container.

Suppose you have the following class:

```
template <class T>
2 class Dictionary {
public:
4   ...
   // returns true if target is in the dictionary
6   bool find(const T& target);
   ...
8 private:
   set<T> words; // contains all the objects in the dictionary
10 };
```

Implement the find member function so that it is as efficient as possible.

Quiz 7



Name:

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What is the time complexity of the find algorithm for a hash table? Explain how the find function works on a hash table.



In unambiguous English prose, pseudocode, or C++, describe how to describe an algorithm that implements `Binltr<T>::operator--()`, the prefix decrement operator from the `Binltr<T>` class discussed in lecture.



Suppose we wish to represent a sparse matrix that has 10 columns and 50000 rows. Select one of the following two data structures to represent the matrix and explain the reasons for your choice.

- ```
map<long unsigned int, vector<double>> A;  
2 vector<map<long unsigned int, double>> B;
```