Quiz 5

(solutions)

1. (20 pts.) True or False questions

___**T**__ $15 n^2 + 100 n = O(n^5)$

___**F**__ $6 n \log n + 4 n = O(n)$

___**F**__ $n \log n + 1024 n \log(\log n) = O(\log n)$

___**T**__ $n^{3/2} + 4 = O(n^2)$

2. (10 pts.) Which of the following is valid
   a) Set<String> s = new Set<String>();
   b) **Set<String> s = new HashSet<String>();**
   c) HashSet<String> s = new Set<String>();
   d) HashSet<String> s = new TreeSet<String>();

3. (20 pts.) Suppose that Microsoft plans to implement the next version of Word's spellchecker using a hash table. Consider the following hash function the role of which is to decide where in the hash table to insert (or find) some English word.

```
public int hashCode( String word )
{
    return word.toUpperCase().charAt(0) – 'A';
}
```

Critique this hash function by pointing out something bad about its design and/or implementation.

All words starting with the same character will be hashed to the same index. This gives only 26 choices for all English words.

4. (20 pts.) A sorting algorithm is said to be *stable* if <u>elements with the same value</u> appear in the output sorted array in the same order as they do in the input array. For example, if the input array is

      3 5A 2A 4 5B 2B 5C

then the output array looks like this

      2A 2B 3 4 5A 5B 5C

In other words, duplicate elements keep their relative order. Is SelectionSort stable? Justify your answer.

No, it's not stable. When we swap the minimum we might change the order.

5. (30 pts.) Given a map

```
HashMap<String, Integer> map = new HashMap<String, Integer>();
```

Write a code segment that creates a second map:

```
HashMap<Integer, String> map2 = new HashMap<Integer, String>();
```

whose keys are the values and values are the keys of the original map.

```
for(  String key : map.keySet() )
        map2.put(map.get(key), key);
```