Name: _____

Algorithms and Data Structures
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Quiz 3
given: 2017-03-16

You have 20 minutes.

Problem 1

Points: 2+2+2+2

Give the Θ-class of the **average**-case time complexity (in terms of the length of the list) of the following sorting algorithms:

1. bubblesort
2. quicksort
3. mergesort
4. a variant of mergesort that splits the list into 3 sublists instead of 2

Problem 2

Points: 3+3

Consider quicksort.

1. Why is it essential to choose a good pivot element?
2. Why is it difficult to choose a good pivot element?

Problem 3

Points: 3+3

Consider the following algorithm for sorting lists of natural numbers:

```
fun foosort(l : List[ℕ]) : List[ℕ] =
    if (l == []) {return []}
    g := ge(l)                                  ge(l) returns greatest element of l
    count := Array[ℕ](g + 1)                    new array with elements count[0], ..., count[g]
    for i from 0 to g
        count[i] := 0
    for i from 0 to length(l) − 1
        count[l[i]] := count[l[i]] + 1
    r := []
    for i from 0 to g
        for j from 1 to count[i]
            r := prepend(i, r)
    return reverse(r)
```

Regarding the efficiency of foosort, give its key

1. advantage
2. drawback