# WinterFinal

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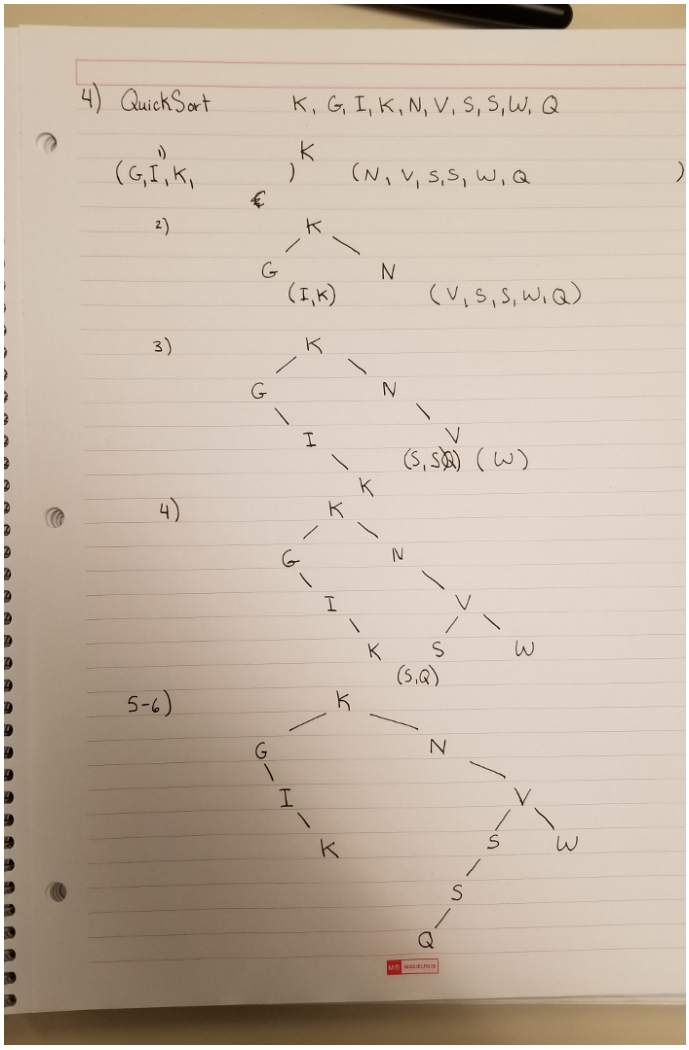
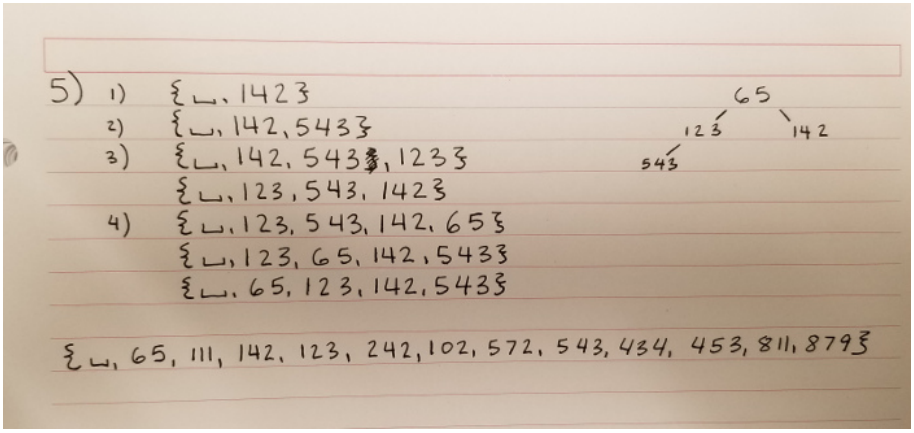
## 1 Question 4



## 2 Question 5




## 3 Question 6

- Prove that any comparison-based algorithm to sort 4 elements requires 5 comparisons.
  Each comparison has a true/false outcome.
  Each branch of that outcome will have another true/false outcome.
  For a decision tree it will require a tree the size of $2^n$ size
- Give an algorithm to sort 4 elements in 5 comparisons.
  Here is a sort of sudo code?

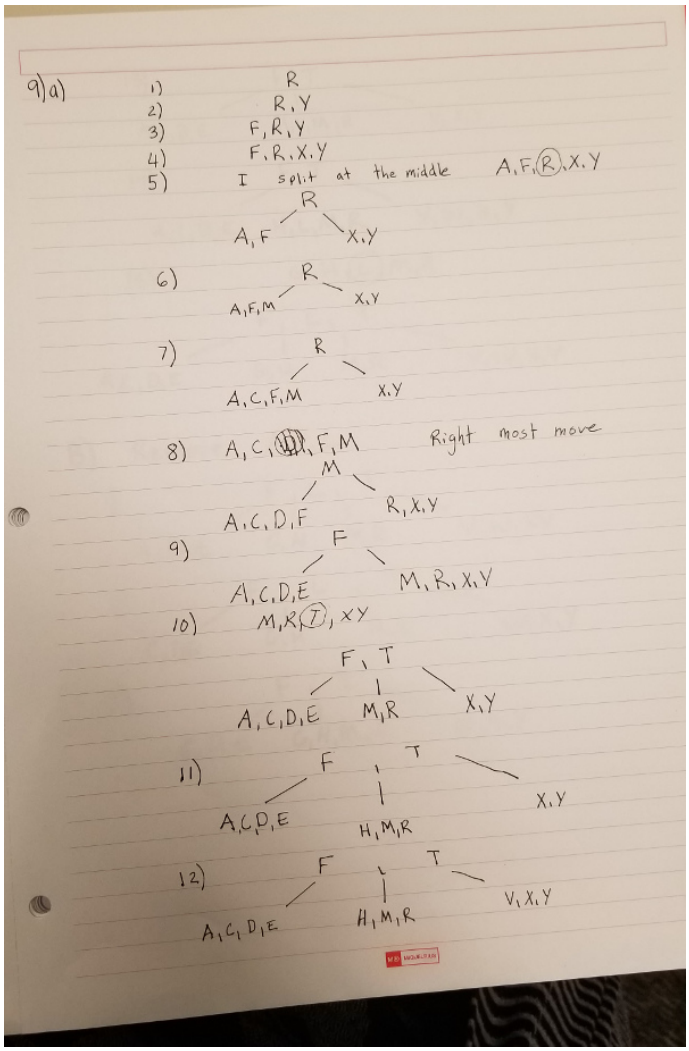
```
result = items[0]
for(int i = 1; i < items.size(); i++)
    if a < b
        Sorry I got lost
```

## 4 Question 8

I don't think this is what you are looking for but this was done after you left... Sorry.

```
for(int i = 0; i < items.size(); i++){
    for(int j = 0; j < items[0].size(); j++){
        if(x == j){
            return true;
        }
    }
}
return false;
```

## 5 Question 9


9) a)
1) R
2) R, Y
3) F, R, Y
4) F, R, X, Y
5) I split at the middle
A, F, R, X, Y
R
A, F
X, Y
6)
R
A, F, M
X, Y
7)
R
A, C, F, M
X, Y
8)
A, C, D, F, M
Right most move
M
A, C, D, F
R, X, Y
9)
F
A, C, D, E
M, R, X, Y
10)
M, R, I, X Y
F, T
A, C, D, E
M, R
X, Y
11)
F
T
A, C, D, E
H, M, R
X, Y
12)
F
T
A, C, D, E
H, M, R
V, X, Y

## 6 Question 9 cont.