

## Tutorial 4: June 6th

1. Draw the decision tree for sorting 4 numbers using  $<$
2. Given an array  $A$  of  $n$  positive integers such that the total number of digits in all integers combined is  $\ell$ , design an algorithm to sort  $A$  in  $O(\ell)$  time.
3. Give the best-case and expected running time for the following function. You can assume that the Shuffle operation requires  $\mathcal{O}(n)$  time and the array  $A$  contains no duplicates.  
Note: the *Shuffle()* function produces each permutation equally likely.

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**Algorithm 1:** MonkeySort( $\mathcal{A}$ )**Input:** Array  $\mathcal{A}$ **Output:** None (Array  $A$  is sorted in-place)

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1 shuffle( $\mathcal{A}$ );
2 if  $\mathcal{A}$  is sorted then return  $\mathcal{A}$ ;
3 else
4   | return MonkeySort $\mathcal{A}$ 
5 end
```

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