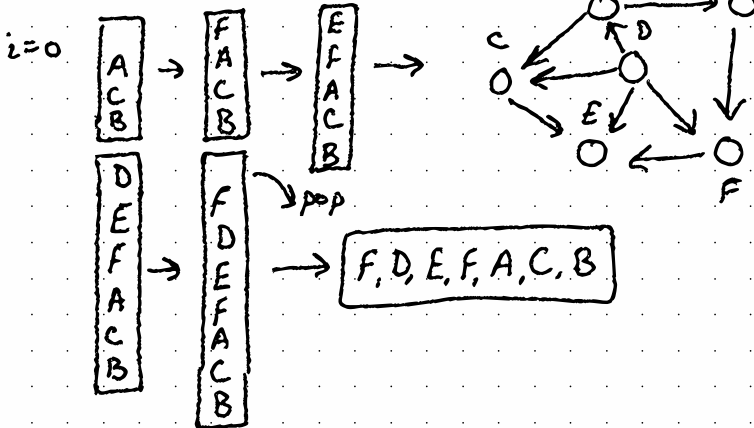


# Data Structures: Homework Ch. 4

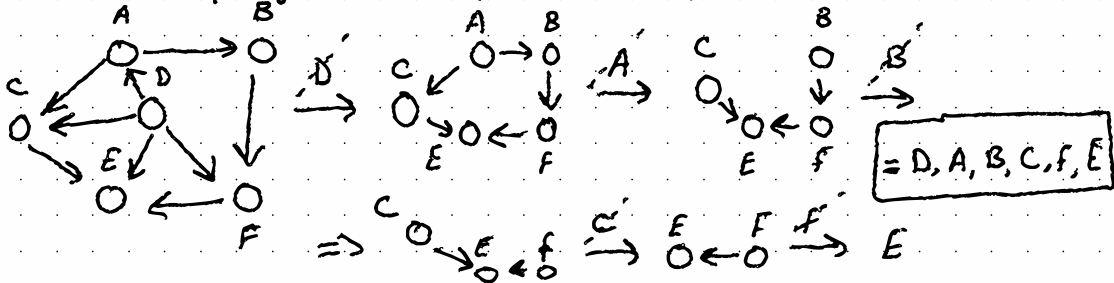
## 1) Insertion Sort: ALGORITHM

1 → ALGORITHMS Unsorted Array  
 2 → A|LGORITHMS  
 3 → A|L|GORITHMS  
 4 → A|G|L|IORITHMS → AGHILMORST ☺  
 5 → A|G|L|O|RITHMS  
 6 → A|G|L|O|R|ITHMS  
 7 → A|G|I|L|O|R|THMS  
 8 → A|G|I|L|O|R|T|HMS  
 9 → A|G|H|I|L|O|R|T|MS  
 10 → A|G|H|I|L|M|O|R|T|S  
 11 → AG|H|I|L|M|O|R|T|S

## 2) Topological Sort (DFS):



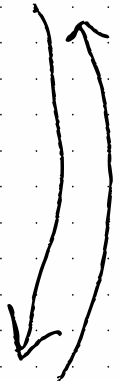
## 3) Topological Sort (Source Remove):



4) Generate all Permutations (Bottom Up):

1  
 12 21  
 123 132 312  
 321 231 213  
 1234 1423 1243 4123  
 1324 1432 1342 4132  
 3124 3412 3142 4312  
 3214 3421 3241 4321  
 2314 2431 2341 4231  
 2134 2413 2143 4213

That took so much  
Concentration!



5) Generate all Permutations (Johnson Trotter):

← ← ← ←  
 1234 1243 1423 4123  
 → ← ← → ← → ← →  
 4132 1432 1342 1324  
 ← ← ← ←  
 3124 3142 3412 4312  
 → ← → ← → ← → ←  
 4321 3421 3241 3214  
 ← ← ← ←  
 3124 3142 3412 4312  
 → → → →  
 4321 3421 3241 3214  
 ← ← ← ←  
 2314 2341 2431 4231  
 → → → →  
 4213 2413 2143 2134

This One is  
Worse!

6) Generate all Subsets (Bottom Up and Squashed)  $\{A_1, A_2, A_3, A_4\}$

1  
 0  $\emptyset$   
 1  $\emptyset, A_1$   
 2  $\emptyset, A_1, A_2, A_1A_2$   
 3  $\emptyset, A_1, A_2, A_1A_2, A_3, A_1A_3, A_2A_3, A_1A_2A_3$   
 4  $\emptyset, A_1, A_2, A_1A_2, A_3, A_1A_3, A_2A_3, A_1A_2A_3, A_4,$   
 $A_1A_4, A_1A_2A_4, A_1A_2A_3A_4, A_2A_4, A_2A_3A_4,$   
 $A_3A_4, A_1A_3A_4$

$$2^4 = 16 \therefore$$

- Tony Sparks