

# CPSC 335 — Lecture #3

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## Timestamps

**09/14/2020 - 07:07:56 PM**

Read Ch. 3. It's about 30 pages. Could be important.

**09/14/2020 - 07:44:53 PM**

Went to bathroom and lost information.

**09/14/2020 - 07:44:53 PM**

Got back and Star said that he finished the problem.

**09/14/2020 - 09:08:49 PM**

Read 3.4 & 3.5. I mean theoretically read all sections cause **THE STUFF COULD BE ON THE TEST!!!**

## Contents

1	After The Icosian Game	1
2	Chapter 3	4

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\*Dedicated to @QuesoGrande a.k.a. Jared D.



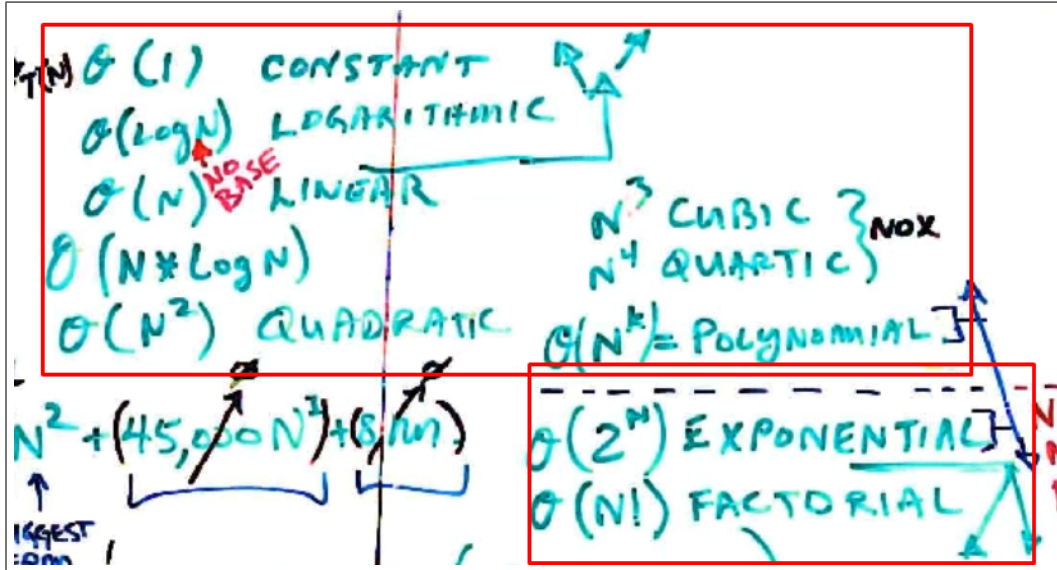


Figure 2: Big(O) Examples — *Important*

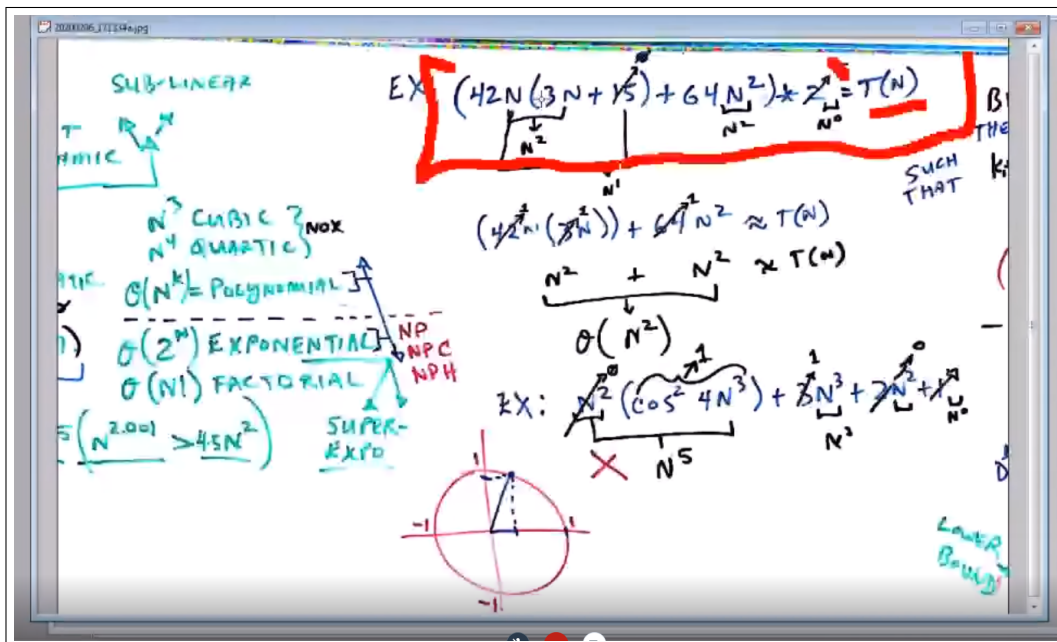


Figure 3: Big(O) Running Times

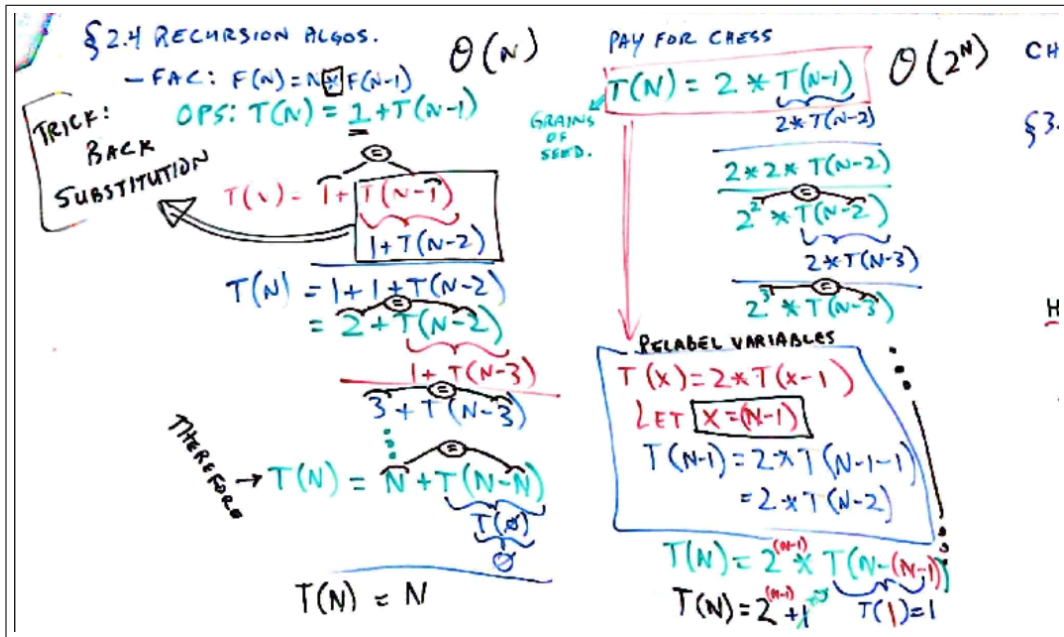


Figure 4: Recursion Algorithm

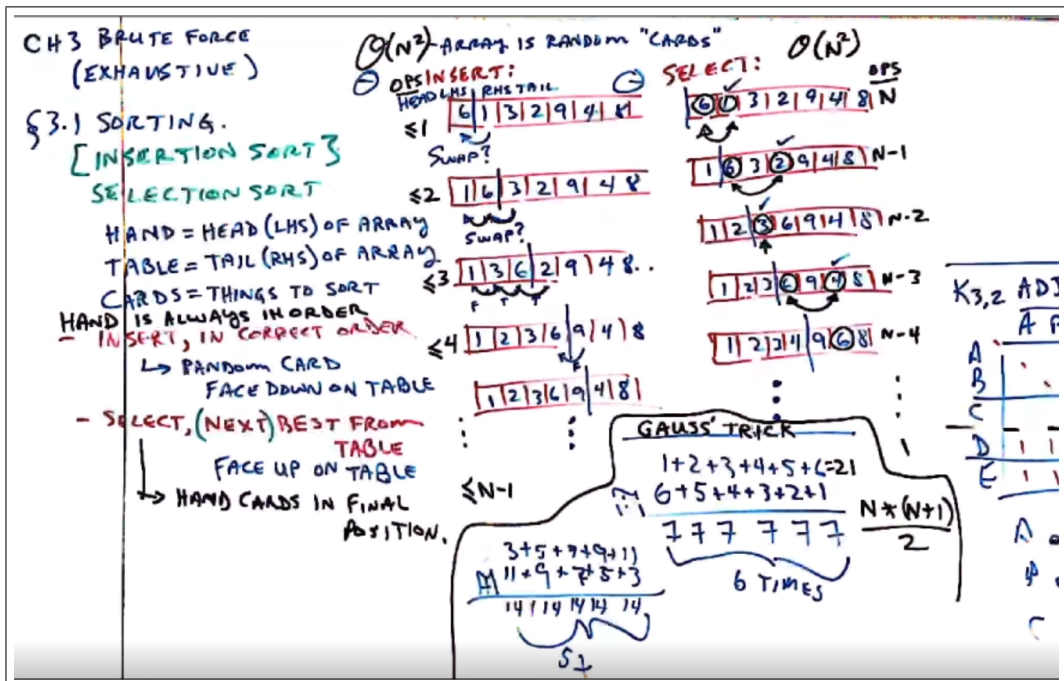


Figure 5: Brute force Algorithm



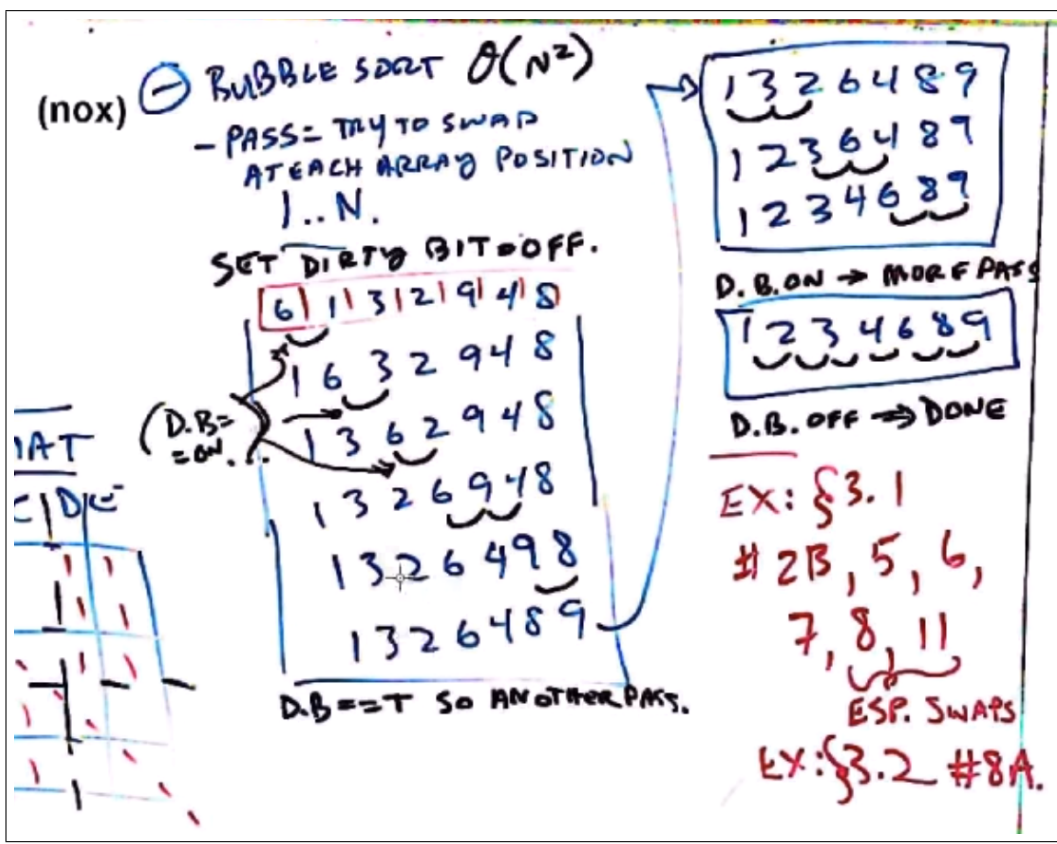


Figure 7: More Bubble Sort

READ § 3.4, 3.5  
 SKIP § 3.3 (Geom)  
 EX 3.4: #1B, 3, 5,  
 10B, 11  
 § KNOW  
 - PARTITION PBM  
 - CLIQUE "  
 - 8-QUEENS "  
 EX 3.5: #1, 4, 6A,  
 7, 8

§ 3.2. <sup>b.f.</sup> SEARCH & STRINGS.  
 SEQ SEARCH:  
 PATTERN: LENGTH = K.  
 STRING: LEN = N.  
 REPR(ESENTATION) =  
 ↳ ARRAY OF CHARS.  
 ALGO: TEST EACH NEXT SPOT.  
 - DOES PATTERN MATCH?  
 PASS: EACH PATTEN CHAR.  
 SOLN: ≈ N PASSES > T = K.  
 ANALZ:  $T(N) = \left[ \begin{matrix} \# \text{ PASSES} \\ \times T(\text{PASS}) \end{matrix} \right]$   
 $T(N) = N \times K = \Theta(N)$

§ 3.4 <sup>B.F.</sup> EXHAUSTIVE SEARCH  
 ⊖ TSP ON A GRAPH  
 PBM: VISIT ALL TOWNS  
 & BACK HOME  
 ⇒ SHORTEST PATH  
 REPR: ADS MAT (VxV)  
 " LIST (VxE)  
 SOLN: GEN ALL CRTS.  
 - KEEP RUNNING BEST  
 PASS: ADD EDGE WGT 3 CRT  
 OF THIS CRT.  
 ANALZ: ↳  $T = \frac{N-1}{T(\text{PASS})} \times \dots$   
 Hom → N-1 → N-2 → ... → 2 → 1  
 # CRTS = (N-1)!  
 $T(N) = (N-1) * (N-1)!$   
 $< N * (N-1)! = N!$   
 $\Theta(N!)$

Figure 8: Search & Strings

§ 3.4 <sup>B.F.</sup> EXHAUSTIVE SEARCH  
 ⊖ TSP ON A GRAPH (KN)  
 PBM: VISIT ALL TOWNS  
 & BACK HOME (CRT) +  
 ⇒ SHORTEST PATH  
 REPR: ADS MAT (VxV)  
 " LIST (VxE)  
 SOLN: GEN ALL CRTS.  
 - KEEP RUNNING BEST  
 PASS: ADD EDGE WGT 3 CRT  
 OF THIS CRT.  
 ANALZ: ↳  $T = \frac{N-1}{T(\text{PASS})} \times \dots$   
 Hom → N-1 → N-2 → ... → 2 → 1  
 # CRTS = (N-1)!  
 $T(N) = (N-1) * (N-1)!$   
 $< N * (N-1)! = N!$   
 $\Theta(N!)$

⊖ KNAPSACK PBM  
 - SACK HAS WGT LIMIT  
 - ITEMS:  
 EACH HAS WGT & VALUE  
 GOAL: PACK FOR MAX VALUE  
 SOLN: GEN ALL COMBS == SUBSETS  
 ↳ KEEP RUNNING BEST SUBSET.  
 CLUE: ←  
 REPR: {A B C D E} = N=5  
 IN/OUT? 1 0 0 1 0 {A D}  
 0 1 1 1 0 {B C D}  
 # COMBS: 2x2x2x2x2 = 2<sup>5</sup> = 2<sup>N</sup>  
 ANALZ  $T(\text{PASS}) = 2 * (N-1) // +$   
 $T(N) = 2^N * (2N + 2)$   
 $= 2^N * 2N = 2^{(N+1)} N = 2^N * 2 * N$   
 $\Theta(N * 2^N)$

⊖ ASSIGNMENT PBM  
 EACH WORKER & EACH (ONE PER ONE)  
 REPR: WXS MAT COSTS.  

	$J_1$	$J_2$	$J_3$	$J_N$
$w_1$	2	9	4	
$w_2$	3	5	7	
$w_3$	6	1	8	
$w_N$				

 GOAL: LEAST COST  
 N! ASSIGNMENT  

Combs	$J_1$	$J_2$	$J_3$
1	$w_1$	$w_2$	$w_3$
2	$w_1$	$w_3$	$w_2$
3	$w_2$	$w_1$	$w_3$
4	$w_2$	$w_3$	$w_1$
5	$w_3$	$w_1$	$w_2$
6	$w_3$	$w_2$	$w_1$

 $2 * 2 * \dots$

Figure 9: Exhaustive Search, TSP: Traveling Salesman Problem