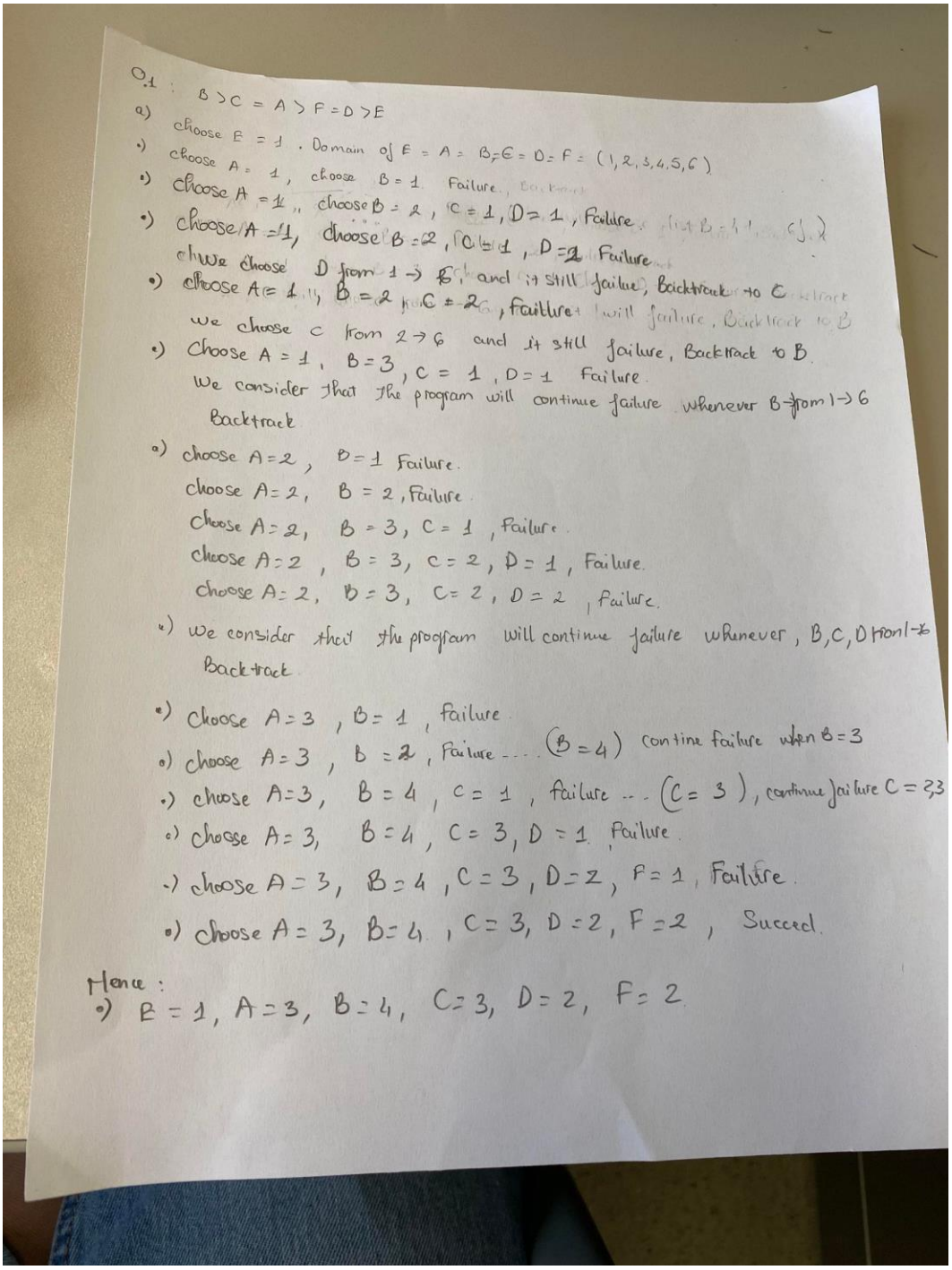
Kevin Thai KXT170005, Nam Nguyen NPN190000

CS 4365.501

Assignment 2

Part I: Written Problems

Question 1:



b) forward checking: B > C = A > F = D > E

- choose E = 1 ; Domain : A = B = C = D = F = {2, 3, 4, 5, 6}
- choose E = 1; A = 2 ; Domain B = {3, 4, 5, 6}
  C = {3}
  D = F = {∅, 4, 5, 6}
- choose E = 1, A = 2 cause D = F = {∅} failure when can not choose "D and "F", Backtrack.
- choose E = 1, Domain : A = {3, 4, 5, 6}
  B = C = D = F = {2, 3, 4, 5, 6}
- choose E = 1, A = 3, Domain. B = {4, 5, 6}
  C = {3}
  D = F = {2}
- choose E = 1, A = 3, B = 4. Domain C = {3}
  D = F = {2}
- choose E = 1, A = 3, B = 4, C = 3, Domain D = F = {2}
- choose E = 1, A = 3, B = 4, C = 3, D = 2 Domain E = {2}
- choose E = 1, A = 3, B = 4, C = 3, D = 2, F = 2 (Solution)

c) Contraint propogation : $B > C = A > F = D > E$

Domain: $A = B = C = D = E = F = \{1, 2, 3, 4, 5, 6\}$

•) choose $E = 1$: Domain $A = B \neq C = D \neq E = F = \{2, 3, 4, 5, 6\}$

•) Choose $E \neq 1$, $A = 2$ cause inconsistent.

Domain $B = \{3, 4, 5, 6\}$

$D = F = \{\emptyset\}$ (inconsistent) *

remove $A = 2$ from Domain of A. $A = \{3, 4, 5, 6\}$

•) choose $E = 1$, $A = 3$, Domain $B = \{4, 5, 6\}$

$C = \{3\}$

$D = F = \{2\}$

By using Contraint propagation D, C, F have 1 choose. We have answer:

•) choose $E = 1$, $A = 3$, $B = 4$, $C = 3$, $D = 2$, $F = 2$ (Solution)

Question 2 & 3:

2) a) Case 1: pigeon / hole

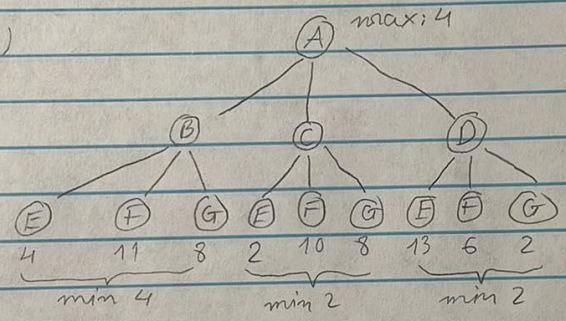
$x_{ij} \vee x_{i(j+1)} \vee \dots \vee x_{in}$

Case 2: hole / pigeon

$\sim x_{ij} \vee \sim x_{(i+1)j}$

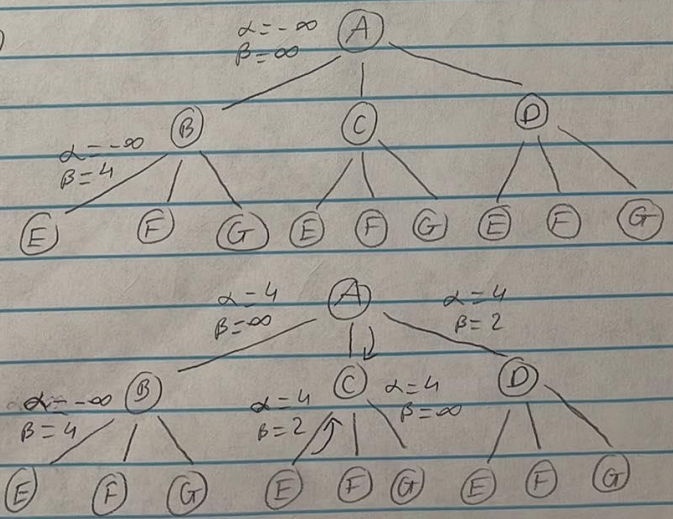
b) For case 1, a pigeon in a hole requires n clauses. Likewise, for case 2, n clauses would be needed. Thus, big O notation is $O(n)$

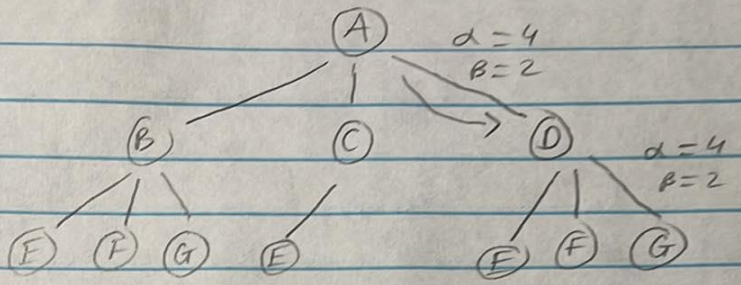
3) a)



Maximizer move : A → B → E

b)

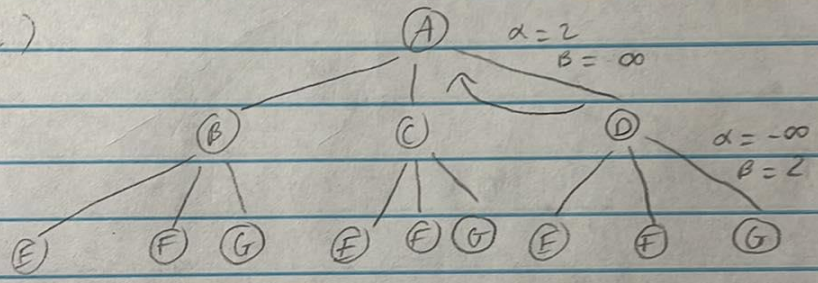


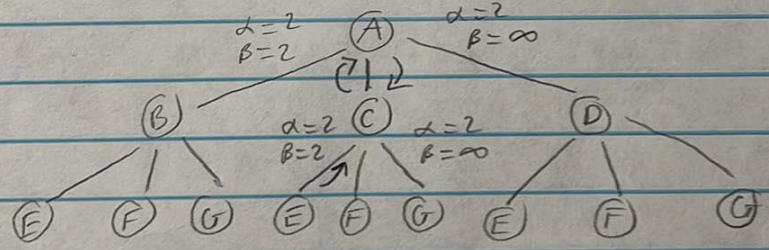


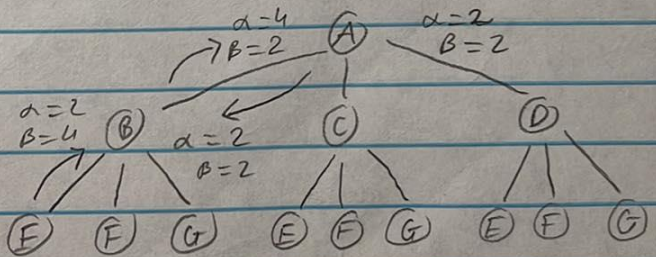
Final value at A is $\alpha = 4, \beta = 2$

↑ max ↑ min

c)







Final value at A is $\alpha = 4, \beta = 2$

↑ max ↑ min