Foundations of AI HW #2

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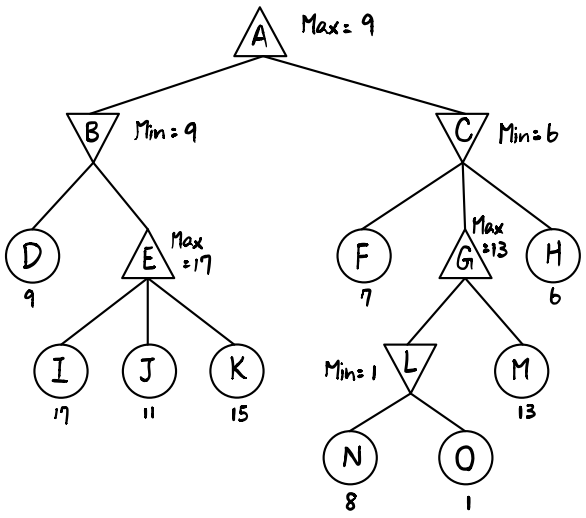
Problem 1.

a) Minimax Search



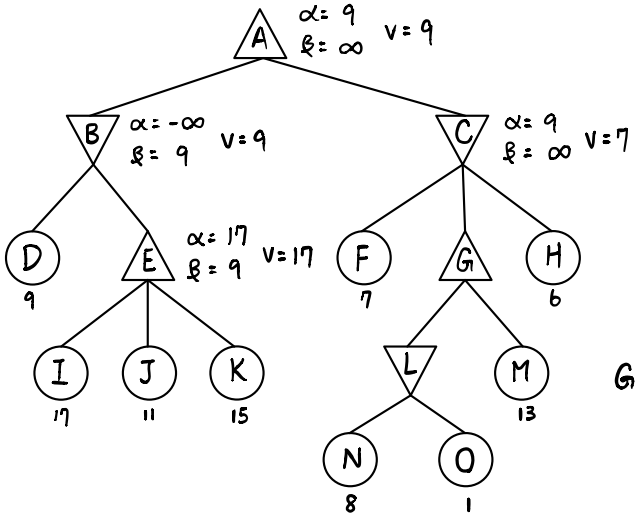
△ : Max Node

▽ : Min Node

○ : Termination Node

#

b) Left-to-Right Alpha-Beta Pruning



△ : Max Node

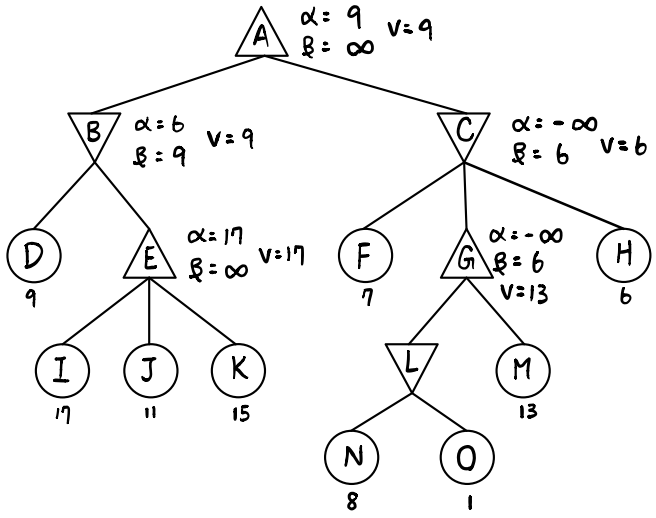
▽ : Min Node

○ : Termination Node

G, H, J, K, L, M, N, O are not examined due to pruning.

#

c) Right-to-Left Alpha-Beta Pruning



△ : Max Node

▽ : Min Node

○ : Termination Node

L, N, O are not examined due to pruning.

#

Problem 2.

(a) Occupation(emily, surgeon) ∨ Occupation(emily, lawyer) #

(b) Occupation(joe, actor)
∧(Occupation(joe, doctor)
∨ Occupation(joe, surgeon)
∨ Occupation(joe, lawyer)) #

(c) ∀ x (Occupation(x, surgeon) → Occupation(x, doctor)) #

(d) ∀ x (Occupation(x, lawyer) → ¬ Customer(joe, x)) #

(e) ∃ x (Boss(x, emily) ∧ Occupation(x, lawyer)) #

(f) ∃ x (Occupation(x, lawyer)
∧ ∀ y (Customer(y, x) → Occupation(y, doctor))) #

(g) ∀ x (Occupation(x, surgeon)
→ ∃ y (Occupation(y, lawyer) ∧ Customer(x, y))) #

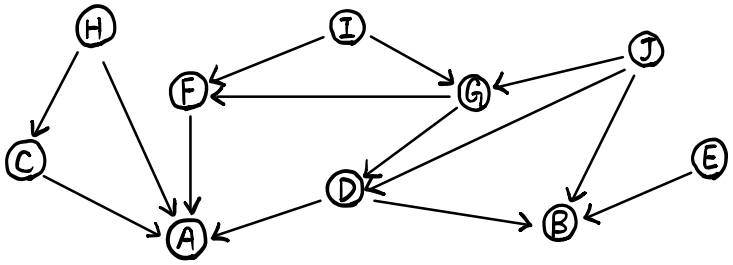
Problem 3.

a) $P(A, B, C, D, E, F, G, H, I, J)$

$= \prod_{x=A}^{J} P(x \mid \text{Parents}(x))$

$= P(A \mid C, D, F, H, I) \cdot P(B \mid D, E, J, G) \cdot P(C) \cdot P(D \mid I)$
$\cdot P(E \mid J) \cdot P(F) \cdot P(G \mid I) \cdot P(H \mid I) \cdot P(I) \cdot P(J)$ #

b)



#

c)

$P(C = f \wedge R = f \wedge S = t \wedge W = t)$

$= P(C = f) \cdot P(R = f \mid C = f) \cdot P(S = t \mid C = f) \cdot P(W = t \mid S = t, R = f)$

$= 0.5 \times (1 - 0.2) \times 0.5 \times 0.9$

$= 0.18$ #

Problem 4.

a) A, C, D, G, I, J #

b) L #