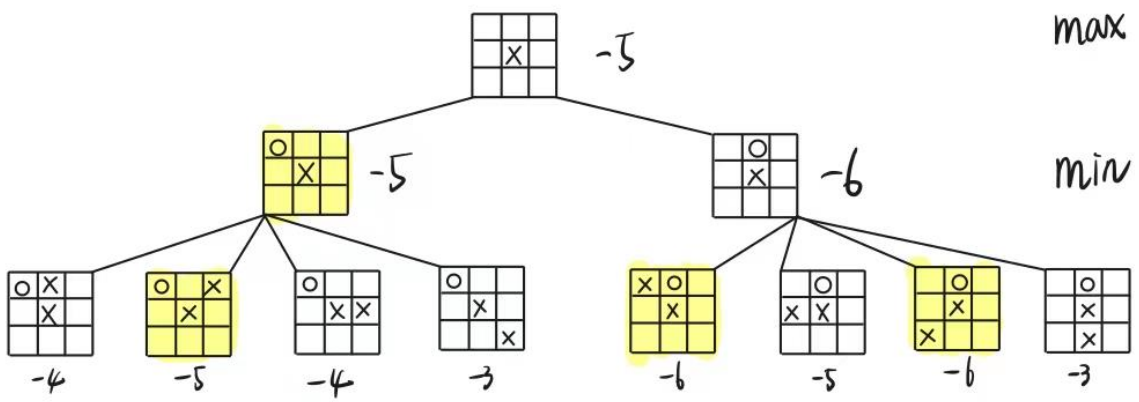
22nd SCSE – Past Year Paper Solution (2021 – 2022 Semester 1)
CE/CZ 3005 – ARTIFICIAL INTELLIGENCE

1 **(a)** TTFTT

(b)



(c) Yes. The only difference is to switch the max and min above and all heuristics of terminal level are positive. In this way, it is still valid.

2 **(a)** P(F | F, a) = 0.2, P(F | F, b) = 0.7, P(C | C, a) = 0.8, P(C | C, b) = 0.1, P(S | S, a) = 0.4, P(S | S, a) = 0.4

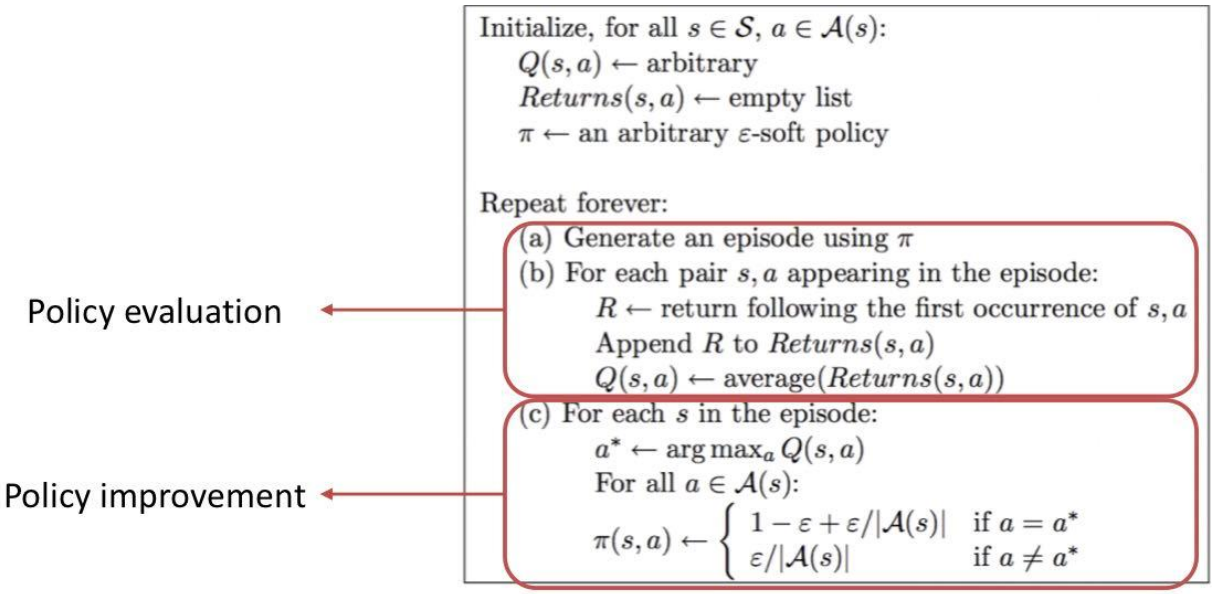
(b)

Q1	a	b	V1	Q2	a	b	V2
F	0	-1	0	F	-0.544	-1.144	-0.544
C	-4	0.2	0.2	C	-3.952	-0.424	-0.424
S	-2.2	-1	-1	S	-2.44	-1.288	-1.288

(c)

Q	a	b
F	0	0
C	0	0.1
S	-0.5	-0.1

(d)



3 **(a)** TTTTF

(b) **(i)**

∀x, man(x) -> !beard(x)∪single(x)∪pilot(x)

$$\frac{man(x): !\,single(x) \cap !\,pilot(x)}{!\,beard(x)}$$

∀x, barber(x)->(∀ y, man(y)∩ !shave(y,y)->shave(x, y))

∀x, ∃y, Barber(x)∩man(y)∩shave(x,y) -> !beard(x)

Man(John)∩pilot(John) ∩barber(John)

(ii)

Yes, Man(John)∩pilot(John) ∩barber(John) and ∀x, ∃y, Barber(x)∩man(y)∩shave(x,y) -> !beard(x) and ∀x, barber(x)->(∀ y, man(y)∩ !shave(y,y)->shave(x, y)) can give the conclusion

4 **(a)** Variable: the capacity of each edge, values from domain
Goal test: (constaints) capacity constraints, flow conservation
States: definded by the valued assigned so far
Initial state: all variables uns=assigned
Actions: assign a value to an unassigned variable

(b) (i) Depth = 3 (root is level 1), branching factor = 1.67
(ii) UCS: optimal, no heustic function, uninformed search, each step costs differently
(iii) always

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