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Worked on Problem 1 with Blake Johnson

Problem 1.

a. State Space = {(Rock, Rock), (Rock, Paper), (Rock, Scissors), (Paper, Rock), (Paper, Paper), (Paper, Scissors), (Scissors, Rock), (Scissors, Paper), (Scissors, Scissors)}

Action Space = {Rock, Paper, Scissors}

State Transition Model

T(S,A,S') –> P(S'| A,S) = P (S',A,S) / P(A,S)

P(A,S) = μ(A|S) P(S)

P(S'|A,S) = P(S',A,S) /(μ(A|S) * P(S))

Entry = (P(S'|A=Rock,S), P(S'|A=Paper,S), P(S'|A=Scissors,S))

S/ S'	**Rock,Rock**	**Rock,Paper**	**Rock,Scissors**	**Paper,Rock**	**Paper,Paper**	**Paper,Scissors**	**Scissors,Rock**	**Scissors,Paper**	**Scissors,Scissors**
Rock,Rock	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)
Rock,Paper	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)
Rock,Scissors	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)	(0,0,0)	(0,0,0)	(1,0,0)
Paper,Rock	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)
Paper,Paper	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)
Paper,Scissors	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)	(0,0,0)	(0,0,0)	(0,1,0)
Scissors,Rock	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)
Scissors,Paper	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)
Scissors,Scissors	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)	(0,0,0)	(0,0,0)	(0,0,1)

P(R= 1|S=s,A=a) => P(R=1,S=s,A=a)/ (μ(A=a|S=s) * P(S=s))

P(R= 0|S=s,A=a) => P(R=0,S=s,A=a)/ (μ(A=a|S=s) * P(S=s))

P(R=-1|S=s,A=a) => P(R=-1,S=s,A=a)/ (μ(A=a|S=s) * P(S=s))

Reward Distribution

Entry = (P(R= 1|S=s,A=a), P(R= 0|S=s,A=a), P(R=-1|S=s,A=a))

State/ Action	**Rock,Rock**	**Rock,Paper**	**Rock,Scissors**	**Paper,Rock**	**Paper,Paper**	**Paper,Scissors**	**Scissors,Rock**	**Scissors,Paper**	**Scissors,Scissors**
Rock	(0,1 ,0)	(0,0,1)	(1,0,0)	(0,1 ,0)	(0,0,1)	(1,0,0)	(0,1 ,0)	(0,0,1)	(1,0,0)
Paper	(1,0,0)	(0,1,0)	(0,0,1)	(1,0,0)	(0,1,0)	(0,0,1)	(1,0,0)	(0,1,0)	(0,0,1)

Scissors	(0,0,1)	(1,0,0)	(0,1,0)	(0,0,1)	(1,0,0)	(0,1,0)	(0,0,1)	(1,0,0)	(0,1,0)

b. $V^{\pi^*}(s) = \max \{R(S,A) + \gamma \sum_{s'} [P(S',A,S) /(\pi(A|S) * P(S)) * V^{\pi^*}(s')]\}$

c. ?

Problem 2

a. $V^{\pi}(s) =$

Problem 3

a. A person who is Radical (R) is Electable (E) if he/she is Conservative (C) otherwise is not electable.
From the statement we know that R implies E. Because if the person is radical then the person is also electable.
We also know that C implies E because if the person is electable if the person is conservative.
Finally we know that E implies C because if the person is not conservative then we know that the person was electable.
Conclusion : R -> (E<->C)

Problem 4

$[(F \rightarrow P) \cup (D \rightarrow P)] \rightarrow [(F \cap D) \rightarrow P]$	//simplify ->
$[(\neg F \cup P) \cup (\neg D \cup P)] \rightarrow [\neg (F \cap D) \cup P]$	//simplify ->
$\neg [(\neg F \cup P) \cup (\neg D \cup P)] \cup [\neg (F \cap D) \cup P]$	//factor ¬
$[\neg (\neg F \cup P) \cap \neg (\neg D \cup P)] \cup [\neg F \cup \neg D \cup P]$	//factor ¬
$[F \cap \neg P \cap D \cap \neg P] \cup \neg F \cup \neg D \cup P$	//remove ¬P
$[F \cap \neg P \cap D] \cup \neg F \cup \neg D \cup P$	//distribute ¬F
$[(F \cup \neg F) \cap (\neg P \cup \neg F) \cap (D \cup \neg F)] \cup \neg D \cup P$	//simplify
$[(\neg P \cup \neg F) \cap (D \cup \neg F)] \cup \neg D \cup P$	//distribute ¬D
$\neg P \cup \neg F \cup \neg D \cup P$	//simplify
True	

This statement is valid because $(P \cup \neg P)$ is always true and (true $\cup$ anything) is always true