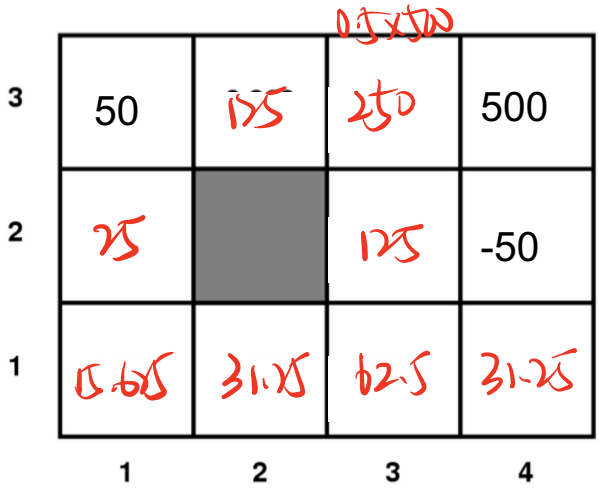
CSCI 561
Foundation for Artificial Intelligence

Discussion Section
(Week 4)

PROF WEI-MIN SHEN WMSHEN@USC.EDU

MDP

Given a Gridworld domain, where terminal states (1,3), (4,3), and (4,2) have rewards 50, 500, and -50 respectively, the set of possible actions are {N,E,S,W, or X for terminal states}, the agent moves deterministically, all V and Q values for non-terminal states have been initialized to 0.0, answer the questions below.



Circle the letter that corresponds to the best answer for the question.

What are the optimal utilitu values V for each state in the above grid if γ = 0.5, c(a)=0, R(s)=0 for the non-terminal states?

(Remember $V_{t+1}(s) = R(s) + Max_{a \varepsilon A}\{c(a) + \gamma \Sigma_{s' \varepsilon S} P(s'|a,s) V_t(s')\}$)

a. $V_{(1,1)}=15.75$, $V_{(1,2)}=25$, $V_{(2,1)}=31.25$, $V_{(2,3)}=125$, $V_{(3,1)}=62.5$, $V_{(3,2)}=125$, $V_{(3,3)}=250$, $V_{(4,1)}=25$
b. $V_{(1,1)}=12.5$, $V_{(1,2)}=25$, $V_{(2,1)}=31.25$, $V_{(2,3)}=125$, $V_{(3,1)}=62.5$, $V_{(3,2)}=125$, $V_{(3,3)}=250$, $V_{(4,1)}=31.25$
c. $V_{(1,1)}=15.625$, $V_{(1,2)}=25$, $V_{(2,1)}=31.25$, $V_{(2,3)}=125$, $V_{(3,1)}=62.5$, $V_{(3,2)}=125$, $V_{(3,3)}=250$, $V_{(4,1)}=31.25$
d. $V_{(1,1)}=12.5$, $V_{(1,2)}=25$, $V_{(2,1)}=25$, $V_{(2,3)}=25$, $V_{(3,1)}=50$, $V_{(3,2)}=100$, $V_{(3,3)}=250$, $V_{(4,1)}=25$
e. None of the above

C

Q-Learning

What are the Q values of state (3,2) in the above grid if $\gamma = 0.5$, $c(a)=0$, $R(s)=-2$ for non-terminal states?
(Remember $Q_{t+1}(a,s) = R(s) + c(a)+\gamma\Sigma_{s'\varepsilon S} P(s'|a,s)\max_{a'\varepsilon A} Q_t(a's')$)

a. $Q_{((3,2),N)}=122$, $Q_{((3,2),E)}=-27$, $Q_{((3,2),S)}=59$
b. $Q_{((3,2),N)}=122$, $Q_{((3,2),E)}=-27$, $Q_{((3,2),S)}=27.5$
c. $Q_{((3,2),N)}=125$, $Q_{((3,2),E)}=-25$, $Q_{((3,2),S)}=62.5$
d. $Q_{((3,2),N)}=120$, $Q_{((3,2),E)}=-27$, $Q_{((3,2),S)}=31.5$
e. None of the above