Name:

Student ID:

Deep RL Course
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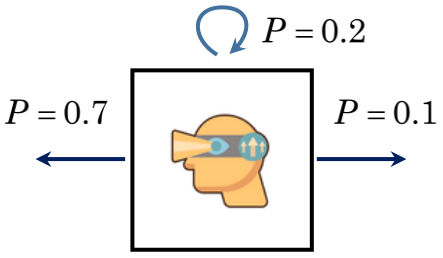
Problem statement:

Consider the following discrete state space and discrete action space:

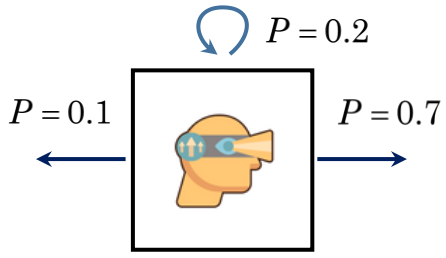
Recharge Position			Goal
$x=0$	1	2	3
$r=1$	0	0	5

The transition probablility is given by

Action: Move Left ($u=-1$)



Action: Move Right ($u=1$)



which is elaborated on the following table:

$(x,\ u)$	$P^u_{x,0}$	$P^u_{x,1}$	$P^u_{x,2}$	$P^u_{x,3}$
(0, -1)	1	0	0	0
(1, -1)	0.7	0.2	0.1	0
(2, -1)	0	0.7	0.2	0.1
(3, -1)	0	0	0	1
(0, 1)	1	0	0	0
(1, 1)	0.1	0.2	0.7	0
(2, 1)	0	0.1	0.2	0.7
(3, 1)	0	0	0	1

Find $V^*(i),\ i=0,\ 1,\ 2,\ 3$. Assume $\gamma=0.9$.

$$V^*(x) = \max_{u\in A} \sum_{x'\in S} P^u_{xx'}\left[R(x,u)+\gamma V^*(x')\right]$$

$$Q^*(x,u) = \sum_{x'\in S} P^u_{xx'}\left[R(x,u)+\gamma \max_{u'\in A} Q^*(x',u')\right]$$

$$V^*(x) = \max_u Q^*(x,u)$$