Nanoquiz Week 9

The questions below are due on Thursday April 12, 2018; 09:50:00 AM.

Nanoquiz Instructions

Nanoquizzes are just like any other tutor exercise, except that they are timed, and that some questions allow a limited number of submissions. When the timer hits zero, you will be prevented from making any further submissions to the nanoquiz, and the answers will be displayed, so **please make sure you have submitted something before that occurs**.
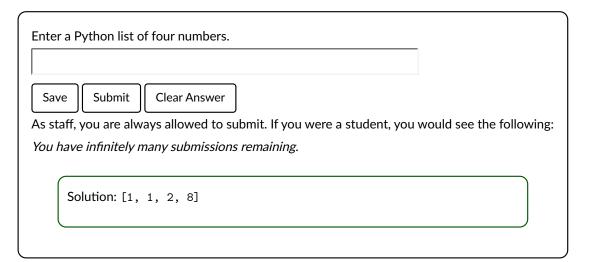
Note that you are free to use any materials you want (electronic or otherwise, including notes, calculators, Python, and Wikipedia) during the nanoquiz, but you are **not** allowed to converse with other humans (including through text message, email, etc).

Nanoquiz

1) STATE MACHINES

For the following state machine, provide the output sequence given the input sequence:

```
s0 = (1, 1)
f(s, i) = (s[0] * s[1], s[1] + i)
g(s) = s[0]
Input: [0, 1, 2, 3]
```

Enter a Python list of four numbers.

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[1, 1, 2, 8]`

2) MDP

Consider an MDP with three states, called 0, 1 and 2, arranged in a loop. There are two actions available in each state:

- Move: with probability 0.8, moves to the next state in the loop and with probability 0.2 stays in the same state.
- Stay: with probability 1.0 stays in the state.

The transition function for each action x is below, where $T(i, x, j)$ is the $P(s_{t+1} = j | a = x, s_t = i)$.

$$T(s_t, \text{Move}, s_{t+1}) = \begin{bmatrix} 0.2 & 0.8 & 0.0 \\ 0.0 & 0.2 & 0.8 \\ 0.8 & 0.0 & 0.2 \end{bmatrix}$$
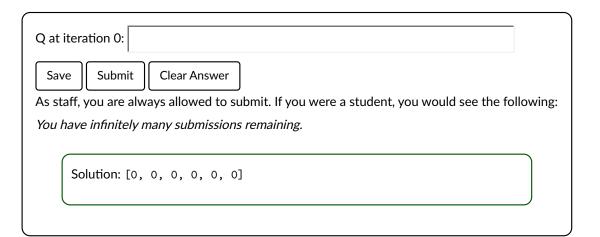
$$T(s_t, \text{Stay}, s_{t+1}) = \begin{bmatrix} 1.0 & 0.0 & 0.0 \\ 0.0 & 1.0 & 0.0 \\ 0.0 & 0.0 & 1.0 \end{bmatrix}$$

R(2, Stay) = 1 and all the other rewards are 0.

Assume that the discount factor is 0.9, that is, $\gamma = 0.9$.

Show the successive estimates of $Q * (s, a)$ generated by Q-value iteration in the form of six numbers

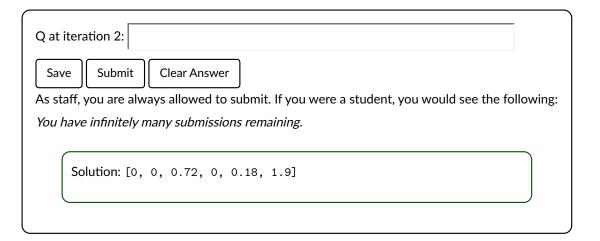`[Q(0,Move), Q(0,Stay), Q(1,Move), Q(1,Stay), Q(2,Move), Q(2,Stay)]`

1)

Q at iteration 0:

Save   Submit   Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[0, 0, 0, 0, 0, 0]`

2)

Q at iteration 1: [   ]

[Save] [Submit] [Clear Answer]

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: [0, 0, 0, 0, 0, 1]

3)

Q at iteration 2: [   ]

[Save] [Submit] [Clear Answer]

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: [0, 0, 0.72, 0, 0.18, 1.9]

4)

Which Q(s,a) entries, if any, are identically equal to 0 at the end of iteration 3? Enter a list of indices from 0 to 5; the list can be empty.

[   ]

[Save] [Submit] [Clear Answer]

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: [1]