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## Knowledge Checks

### Question 1

1/1 point (graded)

Which of the following are two characteristics of Monte Carlo (MC) and Temporal Difference (TD) learning?

- ☒ MC methods provide an estimate of  $V(s)$  only once an episode terminates, whereas TD provides an estimate of after  $n$  steps.
- ☐ MC requires to know the model of the environment i.e. the transition probabilities, whereas TD requires no such model.
- ☒ Both MC and TD are model free methods.
- ☐ Both MC and TD use bootstrapping.



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### Question 2

1/1 point (graded)

Which of the following are two advantages of the TD algorithm compared to the MC algorithms?

- ☐ No Bias in the estimate of value.
- ☒ Works in continuing (non-terminating) environments.

☐ Sensitive to initial values.☐ Model free.☒ Exploits the Markov Decision Process properties to gain efficiency.

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### Question 3

1/1 point (graded)

Which of the following statements about sampling are true for Monte Carlo (MC) and temporal difference (TD) algorithms?

☐ Monte Carlo algorithms randomly sample all possible state-action pairs.☒ TD and MC sample states,  $S_{t+n}$ , from the current state  $S_t$ . ✓☐ MC algorithms use deterministic sampling.☐ TD use random sampling of state-action pairs one time step ahead only.

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### Question 4

1/1 point (graded)

Which two of the following describe bias-variance trade-off between MC and TD?

☐ The MC algorithm reduces variance by sampling until the terminal state, leading to higher bias.

- ☒ The MC algorithm reduces bias by sampling until the terminal state, leading to higher variance.
- ☒ The TD algorithm reduces variance by sampling a small number of time steps, leading to higher bias.
- ☐ The TD algorithm reduces bias by sampling a small number of a time steps, leading to higher variance.



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## Question 5

1/1 point (graded)

What is the difference between on-policy and off-policy learning?

- ☐ On-policy learning learns by evaluating the results of a behavior policy to perform policy improvement on a target policy, whereas off-policy learns from experience by evaluating a target policy and performing policy improvement on the target policy.
- ☒ On-policy learning learns from experience by evaluating a target policy and performing policy improvement on the target policy, whereas off-policy learning learns by evaluating the results of a behavior policy to perform policy improvement on a target policy. ✓
- ☐ On-policy learning learns from experience by evaluating a target policy and performing policy improvement on the target policy, whereas off-policy learning learns by evaluating the target policy to perform policy improvement on a behavior policy.
- ☐ On-policy learning learns from experience by evaluating a behavior policy and performing policy improvement on the target policy, whereas off-policy learning learns by evaluating the results of a behavior policy to perform policy improvement on the behavior policy.

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## Question 6

1/1 point (graded)

Which two statements describe eligibility traces?

- ☒ Eligibility traces down weight the contribution of states that are rarely visited to computing average  $V_s$  or  $Q(s,a)$ .
- ☐ Eligibility traces encourage further exploration of the state space.
- ☐ Eligibility traces assign credit to action.
- ☒ Eligibility traces assign credit to both the most frequently visited and last visited states.



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## Question 7

1/1 point (graded)

Which of the following characterizes Q-Learning and SARSA?

- ☐ Q-Learning uses bootstrapping and SARSA does not.
- ☐ SARSA uses bootstrapping and Q-Learning does not.
- ☐ Both SARSA and Q-Learning are control algorithms.
- ☐ Q-Learning is an on-policy algorithm, whereas SARSA is an off-policy algorithm
- ☒ SARSA is an on-policy algorithm, whereas Q-Learning is an off-policy algorithm



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