1. A policy is a function which maps _____ to _____.

1 point

- ○ States to actions.
- ◉ Actions to probability distributions over values.
- ◉ States to probability distributions over actions.
- ○ States to values.
- ○ Actions to probabilities.

2. The term “backup” most closely resembles the term ___ in meaning.

1 point

- ○ Value
- ◉ Update
- ○ Diagram

3. At least one deterministic optimal policy exists in every Markov decision process.

1 point

- ○ False
- ◉ True

4. The optimal state-value function:

1 point

- ○ Is not guaranteed to be unique, even in finite Markov decision processes.
- ◉ Is unique in every finite Markov decision process.

5. Does adding a constant to all rewards change the set of optimal policies in episodic tasks?

1 point

- (selected) Yes, adding a constant to all rewards changes the set of optimal policies.
- No, as long as the relative differences between rewards remain the same, the set of optimal policies is the same.

6. Does adding a constant to all rewards change the set of optimal policies in continuing tasks?

1 point

- (selected) No, as long as the relative differences between rewards remain the same, the set of optimal policies is the same.
- Yes, adding a constant to all rewards changes the set of optimal policies.

7. Select the equation that correctly relates v_* to q_*. Assume π is the uniform random policy.

1 point

- $v_*(s) = \sum_{a,r,s'} \pi(a|s)p(s', r|s, a)[r + q_*(s')]$
- $v_*(s) = \sum_{a,r,s'} \pi(a|s)p(s', r|s, a)[r + \gamma q_*(s')]$
- $v_*(s) = \sum_{a,r,s'} \pi(a|s)p(s', r|s, a)q_*(s')$
- (selected) $v_*(s) = max_a q_*(s, a)$

8. Select the equation that correctly relates q_* to v_* using four-argument function p.

1 point

- $q_*(s, a) = \sum_{s',r} p(s', r|a, s)[r + v_*(s')]$

- ○ $q_*(s,a) = \sum_{s',r} p(s',r|a,s)\gamma[r + v_*(s')]$
- ◉ $q_*(s,a) = \sum_{s',r} p(s',r|a,s)[r + \gamma v_*(s')]$

9. Write a policy π_* in terms of q_*. **1 point**

- ○ $\pi_*(a|s) = q_*(s,a)$
- ○ $\pi_*(a|s) = \max_{a'} q_*(s,a')$
- ◉ $\pi_*(a|s) = 1 \text{ if } a = \text{argmax}_{a'} q_*(s,a'), \text{ else } 0$

10. Give an equation for some π_* in terms of v_* and the four-argument p. **1 point**

- ◉ $\pi_*(a|s) = 1 \text{ if } v_*(s) = \sum_{s',r} p(s',r|s,a)[r + \gamma v_*(s')], \text{ else } 0$
- ○ $\pi_*(a|s) = \max_{a'} \sum_{s',r} p(s',r|s,a')[r + \gamma v_*(s')]$
- ○ $\pi_*(a|s) = \sum_{s',r} p(s',r|s,a)[r + \gamma v_*(s')]$
- ○ $\pi_*(a|s) = 1 \text{ if } v_*(s) = \max_{a'} \sum_{s',r} p(s',r|s,a')[r + \gamma v_*(s')], \text{ else } 0$