COMPSCI 687 Pop Quiz 4

Name: _____

Instructions. This quiz is closed book and closed notes. You may not communicate with any other students or use any electronic devices. You have **5 minutes** to complete the quiz. As discussed in class, answers to Questions 1–4 must be **perfect down to the symbol** to receive credit. For Questions 5 and 6, you may use symbols or words; exact wording is not required. Each question is graded as either correct or incorrect; there is no partial credit. **If your name is not legible, you will receive a 0 on the quiz.**

1. Give the definition of v^π. Your answer should be two lines. The first specifies the input and output sets (e.g., $f : \mathcal{X} \to \mathcal{Y}$) and the second should specify the function values (e.g., $f(x) = \Pr(X = x)$). You may omit the quantifiers (e.g., $\forall x \in \mathcal{X}$).

2. Give the definition of q^π. Your answer should be two lines. The first specifies the input and output sets (e.g., $f : \mathcal{X} \to \mathcal{Y}$) and the second should specify the function values (e.g., $f(x) = \Pr(X = x)$). You may omit the quantifiers (e.g., $\forall x \in \mathcal{X}$).

3. Give the Bellman equation for v^π as a recursive expression for v^π using R, p, π, and γ. Start with $v^\pi(s) =$. You may omit the quantifier and the sets being summer over (e.g., writing $\sum_{a'}$ instead of $\sum_{a' \in \mathcal{A}}$.

4. Give the Bellman optimality equation for v^* as a recursive expression for v^* using R, p, and γ. Start with $v^*(s) =$. You may omit the quantifier and the sets being summer over (e.g., writing $\sum_{a'}$ instead of $\sum_{a' \in \mathcal{A}}$.

5. Give the definition of the preorder on policies that we defined in class. That is, $\pi' \geq \pi$ if and only if:

6. The definition of an optimal policy in terms of the preorder on policies defined by $\geq$ is: