

## CAP 6929 Homework 2

**Due: Feb-25 (Friday), 2022 (11:59PM)**

**1. Please read the lecture notes and fill in the definitions for following terms:**

(a)  $p(s', r | s, a) = \Pr(???)$

(b)  $R(s, a) = E[???]$

(c)  $\pi(s, a) = \Pr(???)$

(d)  $\pi^* = \operatorname{argmax} ???$

(e)  $V(s) = ???$

(f)  $Q(s, a) = ???$

**2. Multiple choices for the following problems**

**a)** Decide to which learning type the following tasks belong. Choose from the options: supervised, unsupervised or reinforcement learning.

1. Training a program to play tic tac toe
2. Finding patterns in market data
3. Analyzing the sentiment of a sentence
4. Determining credit-worthiness of bank customers
5. Have a robot balance a pole
6. Analyze how a sequence of treatments affect a patient's health
7. Predict tomorrow's weather
8. Determining number of species in various animal data

**b)** Which approach of reinforcement learning (model-based or model-free) would you choose for the following games? Explain the reasons for your choice.

1. Tic tac toe
2. Chess