

CSCE 274 Fall 2022

Homework 3 (3% over the final grade)

Assigned: November 15, 2022

Due: November 24, 2022

Instructions

Please read carefully the following questions and make sure to give the answers asked for. Don't give a beautiful answer to the wrong question. If you have any doubts, please let me know.

The document containing the answers should be uploaded on the CSE Moodle (<http://dropbox.cse.sc.edu>) and should have the following characteristics:

1. Header with the code of the class, the semester and year, the homework number, and your name.
e.g., CSCE 274 Fall 2022 – Homework 3 – Ibrahim Salman
2. Your answers, clearly identifying the answered assignments.
3. The name of the file should be in the following format:
csce274_fall2022_<hw#>_<last_name>.pdf
e.g., csce274_fall2022_hw3_salman.pdf

Question 1

A discrete PI controller is used to control a robot. The setpoint is 36, the proportional and integral gains are 2 and 4, respectively. The sensor that is able to measure the state is sampling every 3 seconds. When the controller is executed, the first four states are 33, 37, 38, and 36. **Compute** the output of the controller after the fourth sensor reading. **Show** your work.

Question 2

Given a robot in state x that executes a , and the new state in which the robot is going to be is y , with reward 5, the following Q-table, and learning rate parameter 0.2 and discount factor 0.9, **formalize** with the correct symbols the problem and **update** the Q-table using the Q-learning algorithm. **Show** your work.

State	Action	Q
x	a	45
y	a	20
x	b	10
y	b	3
x	c	20
y	c	10