Alexandria University
Faculty of Engineering
Computer and Communications Program

Artificial Intelligence Course
Assigned: Thursday, December 19, 2024
Due: Thursday, December 26, 2024

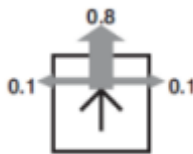**Assignment 4**
Markov Decision Process

1 Problem Statement

Consider the following 3x3 world shown in the figure

The agent has four actions Up, Down, Right and Left. The transition model is: 80% of the time the agent goes in the direction it selects; the rest of the time it moves at right angles to the intended direction. A collision with a wall results in no movement.

2 Requirements

1. Implement value iteration for this world for each value of r below

   - r =100.
   - r = 3
   - r = 0
   - r = -3

2. Use discounted rewards with a discount factor of 0.99

3. Show the policy obtained in each case.

4. Explain intuitively why the value of r leads to each policy.

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2.1   Bonus

Find the optimal policy for each of the previous cases of r using Policy Iteration algorithm. You may start the algorithm with a randomly generated policy.

2.2   Further Notes

- You may use Java, Python or C++ for your implementation.

- Copied assignments will be severely penalized. whether from online or each other

- You can work in groups of 2 or 3.

- You will be evaluated individually in discussion

Good Luck