Cairo University
Faculty of Computers & Artificial Intelligence
Department of Computer Science
Artificial Intelligence Course

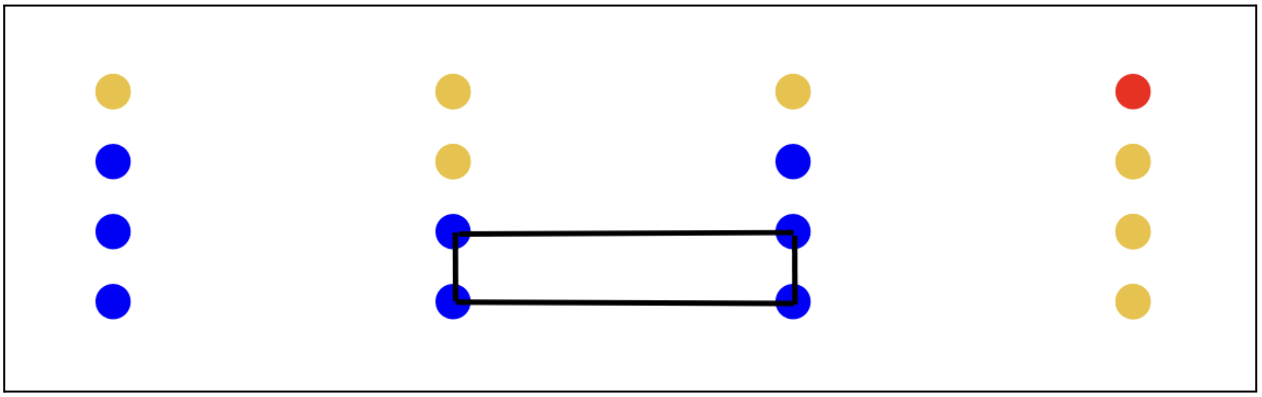
Assignment 2

Instructions

- Assignment grade is 7 (6 + 1 Bonus)
- This assignment is submitted in a group maximum of 4 students and minimum of 2
- Students must be from the same groups or different groups taught by the same TAs
- Failure to comply with the previous two points will result in a penalty
- Cheating check will be applied and positive submissions will be graded -6

Question 1 (3 Marks):

In this question, you are required to implement a prolog code that uses **uninformed search (breadth or depth first)** to solve the following puzzle or indicate that there is no solution.



- You will be given a board that consists of N x M cells.
- Each cell contains a color (Red, Yellow or Blue).
- Your task is to find color cycles for any of the three colors
- For example, as shown in the picture, cells 2,1 -> 2,2 -> 3,2 -> 3,1 form a blue cycle
- Another cycle could be cells 2,0 -> 2,1 -> 3,1 -> 3,0
- Note that yellow and red colors do not form cycles in this example.
- Your code should print at least one of these cycles including its color (if any) or no cycles exist
- Cycle defined by the following cells $c_1, c_2, ..., c_k$ must have the following:
  - These cells are different (no duplicates)
  - At least 4 cells (or more)
  - All cells have the same color
  - The cells are adjacent to each other
- **You are allowed to use the search engine for uninformed search that we given in the lab**
- Your main tasks are:
  - **Design input**
  - **Design state representation**
  - **Design moves**
  - **Design output**

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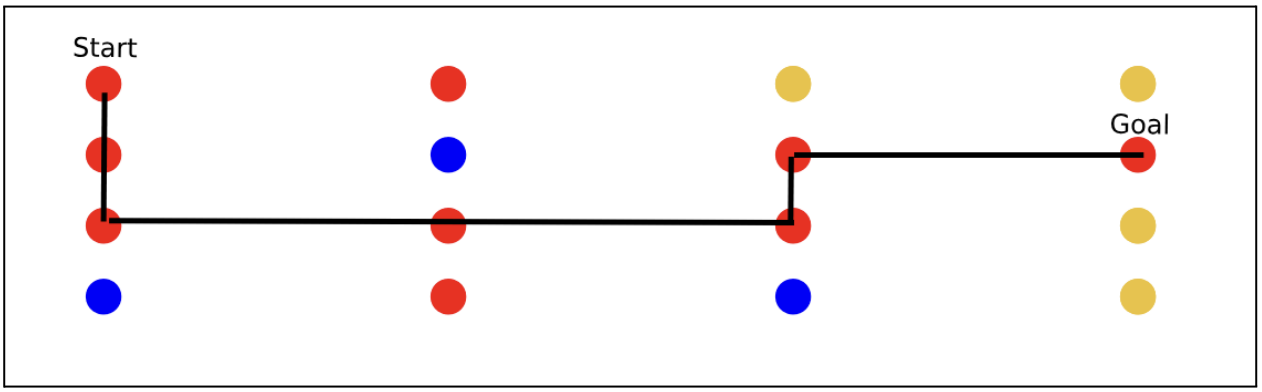
Question 2 (4 Marks):

In this question, you are required to implement a prolog code that uses **informed search (A*)** to solve the following puzzle or indicate that there is no solution.



- You will be given a board that consists of N x M cells.
- Each cell contains a color (Red, Yellow or Blue).
- You will be given a start and goal cells of the same color
- Your task is to find if there is a path between the start and the end cells.
- All cells on the path must be from the same color
- For example, as shown in the picture, 0,0 is the start cell and 1,3 is the end cell. The correct path is 0,0 -> 1,0 -> 2,0 -> 2,1 -> 2,2 -> 1,2 -> 1,3
- Your code should print at least one path (if any) or no paths exist
- Diagonal moves are not allowed. You can move left, right, up and down
- Path must not contain repeated cells
- **You are allowed to use the search engine for informed search that we given in the lab but make sure it uses A***
- Your main tasks are:
  - **Design input**
  - **Design state representation**
  - **Design moves**
  - **Design heuristic predicate**
  - **Design output**