FACULTY OF COMPUTER SCIENCE AND ENGINEERING

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Lab Duration:3 hr. AI321L Machine Learning Marks: 10 Lab No: 6 Instructor: Asim Shah

## **Task: Solving a Simple CSP Problem**

### ****Problem Description:****

You are given data is:

* **x1** = {1, 2}
* **x2** = {2, 3}

The **constraint** between them is:

x1 != x2

Your task is to **find all valid assignments** of (x1, x2) that satisfy the given constraint.

### ****Learning Objectives****

By the end of this lab, students will be able to:

* Understand **variables, domains, and constraints** in CSPs.
* Implement a **recursive backtracking algorithm** to explore assignments.
* Identify **valid vs. invalid solutions** based on given constraints.
* Visualize and interpret the **search space** of a CSP.

### ****Instructions****

1. Identify variable, domain and constarints
2. Implement a **backtracking algorithm** that:
   * Assigns values recursively to variables.
   * Checks constraints before proceeding.
   * Backtracks when a constraint is violated.
3. Print all possible assignments and indicate which ones are **valid or invalid.**
4. Display a **summary** showing:
   * Total possible assignments
   * Number of valid solutions
   * Constraint satisfaction rate

Expected Output:

