**Task 1: Map Colouring (3-region map)**

**Problem:**

**You have 3 countries: A, B, and C.**

**A borders B and C**

**B and C do not border each other**

**You must colour the map using 3 colours (Red, Green, Blue), with no two adjacent regions having the same colour.**

What to do:

List variables

VARIBALES FOR 3 COUNTRIES:-

* COUNTRY 1:- A
* COUNTRY 2:- B
* COUNTRY 3:-C

Assign domain->

DOMAIN FOR EACH VARIABEL :-

* A:-(RED, BLUE, GREEN)
* B:-(RED, BLUE, GREEN)
* C:-(RED, BLUE, GREEN)

Define constraints (binary)

CONSTRAINTS (BINARY):-

* A≠B (A Borders B)
* A≠C (A Borders C)
* No constraint between B and C *(they do not border each other)*

**TASK 2:-**

**Task 2: Simple Sudoku (2x2 mini-grid)**

**Problem:**

**You are given a 2x2 Sudoku grid with 4 cells: A1, A2, B1, B2.**

**Each must contain a digit from 1 to 2**

**No digit repeats in any row or column**

What to do:

Define the variables

VARIABLES:-

A1

A2

B1

B2

What is the domain of each cell?

**Domains (for each variable)**

* A1: {1, 2}
* A2: {1, 2}
* B1: {1, 2}
* B2: {1, 2}

Write all constraints (all-diff style)

**Row Constraints:**

* A1 ≠ A2
* B1 ≠ B2

**Column Constraints:**

* A1 ≠ B1
* A2 ≠ B2

**Task 3: Exam Scheduling**

**Problem:**

**You must schedule exams for 3 subjects: Math, English, and Science.**

**Each exam must be scheduled in one of 2 time slots: Morning, Afternoon**

**The same teacher teaches Math and Science, so those exams cannot be at the same time**

**What to do:**

**Variables = subjects**

**Variables**

* Math
* English
* Science

**Domains = time slots**

**Domains**

So:

* Math: {Morning, Afternoon}
* English: {Morning, Afternoon}
* Science: {Morning, Afternoon}

**Constraint = binary (Math ≠ Science)**

**✅ Constraint (Binary)**

Math ≠ Science *(because the same teacher teaches both)*

No constraints between:

* Math and English
* English and Science

**Task 4: Cryptarithmetic Puzzle (SEND + MORE = MONEY)**

**Problem:**

**In the puzzle SEND + MORE = MONEY, each letter stands for a unique digit from 0–9.**

**No leading digit (S or M) can be 0.**

**What to do:**

Identify all letter variables

**Variables**

Letters used:

* S, E, N, D, M, O, R, Y

State domain for each

**Domains**

Each variable (letter) can take values from 0 to 9:

* S, E, N, D, M, O, R, Y ∈ {0, 1, ..., 9}

But:

* S ≠ 0
* M ≠ 0 *(no leading zero in SEND or MORE or MONEY)*

Define constraints:

All Diff

**Constraints**

**1. All Diff Constraint**

All letters must be assigned **different digits**:

* All Diff(S, E, N, D, M, O, R, Y)

**2. Leading Digit Constraint (Unary)**

* S ≠ 0
* M ≠ 0

Arithmetic equation holds

S ≠ 0, M ≠ 0