# Shiv Nadar Institute of Excellence
# CSD311: Artificial Intelligence

**Assignment #1**

**(Prolog)**

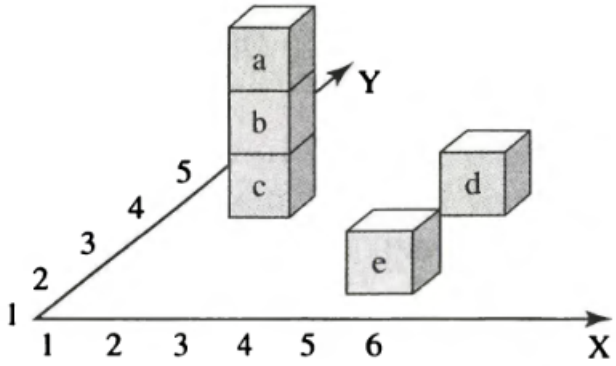
27-8-2022

Max marks: 100
Due: 6-9-2022, 11.59pm

1. Extend the Prolog program we discussed in class with the following predicates:
   `uncle(X, Y) - X is Y's uncle. That is X is the bother of one of Y's parents.`
   `aunt(X, Y) - X is Y's aunt. That is X is the sister of one of Y's parents.`
   `cousin(X,Y) - X, Y are cousins. That is at least one of X's and Y's parents and have a brother-sister relationship.`
   Use the above relationships to find all possible pairs that are uncles, aunts and cousins. [15]

2. For the relationship program done in class replace the predicates `parent, grandfather, grandmother, ancestor` by `child, grandson, granddaughter successor` and redo question 1. [25]

3. The figure below shows a simple blocks world where each block is a unit cube with a unique label and is placed on a two dimensional grid. Blocks can be stacked one on top of another as shown. A block's (x,y) position is defined by the coordinates of the left most, bottom most corner of the block. A block's z coordinate can be inferred by counting the number of blocks below it. The z coordinate is 0 if the block is on the `table`. Define predicates: at(B,X,Y) - Block B is at location (X,Y), on(B1,B2) - block B1 is on B2, z(B,Z) - Block B has z-coordinate of Z.




   1. Create a scene with a certain number of blocks and define the facts and rules using the above predicates.
   2. Find a way to count the number of blocks in the scene.
   3. Find a way to count the number of blocks that are on some other block.

If you need any supplementary predicates define them. But do not trivialize the problem by having a predicate which gives the answer directly e.g. a `count` predicate for total number of blocks.

You must test your code for a few different scenes with different configurations. [30]

4. The figure below is a map of central Europe comprising the ten countries Germany (DE), Switzerland (CH), Italy (IT), Hungary (HU), Austria (AT), Slovenia (SI), Czech Republic (CZ), Slovakia (SK), Poland (PL) and Croatia (HR) represented by their internet country domain names and the Adriatic sea (ADS) the sea bordered by Italy. Slovenia and Croatia.


As you can see maps are always coloured so that neighbouring countries are given different colours. Assuming we colour ADS as blue. Use red, green, yellow and blue to colour the remaining 10 countries. Create a neighbour relation for countries and for distinct colours and then with a single rule find all possible colourings for the map. [30]