Objectives

Propositional Logic as a Modeling Tool;

Instruction

Each team is required to submit ONE hard copy of the solutions at the end of the seminar session. To get the credit for a team assignment, **a team member must actively participate in the problem-solving process and sign the submitted solution.**

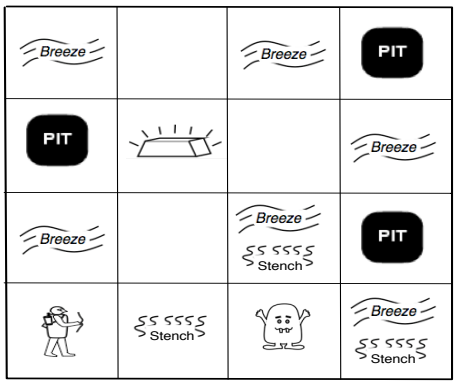
A. Logic Formulation of the Wumpus World

The wumpus world is a dark cave consisting of a 4 x 4 grid of rooms. These rooms are connected by passageways. Hidden in some rooms are (1) bottomless pits, (2) a dangerous beast named wumpus, and (3) a heap of gold. There is also a brave hunter trying to find the gold and get out of the cave safely.

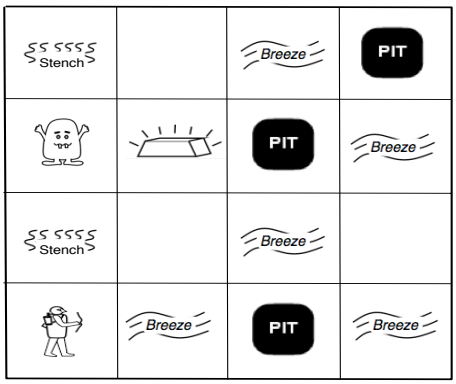
Your task is to use propositional logic to model the wumpus world. To begin with, we identify the rooms with their grid coordinate (i, j). E.g., Room (1, 1) is the room at the bottom-left corner of the grid. To describe the environment in propositional logic, we introduce the following propositions: for a particular pair of numbers (i, j),

- ▷ $p_{i,j}$ = "there is a pit in room (i, j)",
- ▷ $w_{i,j}$ ="the wumpus is in room (i, j)",
- ▷ $s_{i,j}$ = "room (i, j) is smelly",
- ▷ $b_{i,j}$ = "room (i, j) is breezy"

The truth value of these propositions depends on the context of the wumpus world. For example, $w_{1,3}$ is F in the wumpus world A, but T in the wumpus world B.



(a) Wumpus World A



(b) Wumpus World B

Write the following statements symbolically and decide its truth value for each of the two Wumpus worlds.

1. Room (3, 2) is breezy, but not smelly

2. The wumpus is in room (3, 1) or room (1, 3)

3. The wumpus is in a room adjacent to room (1, 3) (**Note that three rooms are adjacent to room (1, 3)**)

4. Room (1, 3) does not have a pit, or rooms adjacent to it are all breezy

5. The wumpus is in room (3, 1) if and only if rooms adjacent to room (3, 1) are all smelly.

Session: _____ Team Number: _____

1. Name (Print): _____ Signature: _____
2. Name (Print): _____ Signature: _____
3. Name (Print): _____ Signature: _____
4. Name (Print): _____ Signature: _____
5. Name (Print): _____ Signature: _____