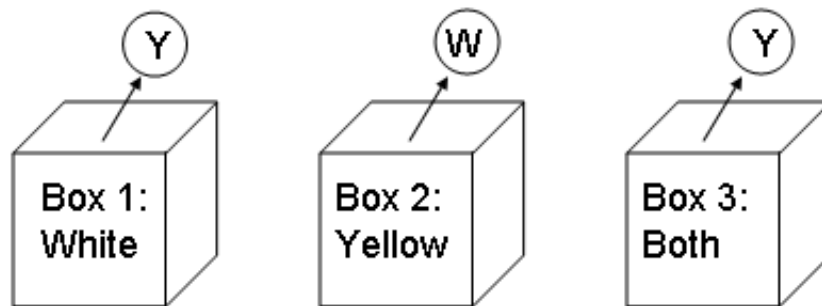


CSCE 420, HW #3

due: Thurs, Nov 3, 2016 (hand-in in class)

1. You are the proprietor of Sammy's Sport Shop. You have just received a shipment of three boxes filled with tennis balls. One box contains only yellow tennis balls, one box contains only white tennis balls, and one contains both yellow and white tennis balls. You would like to stock the tennis balls in appropriate places on your shelves. Unfortunately, the boxes have been labeled incorrectly; the manufacturer tells you that you have exactly one box of each, but that each box is definitely labeled wrong. One ball is drawn from each box and observed (assumed to be correct). Given the initial (incorrect) labeling of the boxes above, and the three observations, use Propositional Logic to derive the correct labeling of the middle box.



- Use propositional symbols in the following form: O1Y means a yellow ball was drawn (observed) from box 1, L1W means box 1 was initially labeled white, and C1B means box 1 actually contains both types of tennis balls.
- The initial facts describing this particular situation are: {O1Y, O2W, O3Y, L1W, L2Y, L3B}

a. Using these symbols, write a propositional knowledge base that captures the implications of what different observations or labels mean, as well as constraints inherent in this problem (e.g. all boxes have different contents). Do it in a complete and general way (writing down all the rules and constraints for this domain, not just the ones needed to make the specific inference about the middle box). *Do not include derived knowledge* that depends on the particular labeling of this instance shown above (e.g. $\neg C1W$).

b. Prove that box 2 must contain white balls (C2W) using Natural Deduction.

c. Prove C2W using Resolution Refutation.

2. Write a propositional knowledge base describing the 4-Queens problem.

	A	B	C	D
1				
2				
3				
4				

	Q		
			Q
Q			
		Q	

a. Solve the puzzle by computing a model using DPLL **using NO heuristics**.
(Trace the steps, indicate what decisions are made in each iteration, indicate if and when back-tracking occurs, and indicate what the final solution is.)

b. "Solve" the puzzle by computing a model using DPLL **using the PureSymbol and UnitClause heuristics**.
(Trace the steps, indicate what decisions are made in each iteration, indicate if and when each heuristic is applied, and indicate what the final solution is.)