KR homework #3. **Due 9am, Feb 8th**

For problems #1 and #2, provide a proof using resolution theorem proving. I.e.:

Step 1: Convert natural language to first-order logic

Step 2: Normalize FOL into "conjunctive normal form" (and number these statements).

Step 3: Resolution: posit the inverse of the goal, and find a contradiction.

(1) Story: ***Tails I win; Heads you lose.***

Prove: I win. (You may need to add additional background knowledge to make your proof work.)

(2) Story:

Brenda has been diagnosed with breast cancer. If a patient has a breast cancer diagnosis, they should have a mastectomy OR a lumpectomy. After surgery, breast cancer patients should then have radiation therapy OR chemotherapy. Dr. Amy operated on Brenda. Unless the patient trusts their surgeon, they are afraid of surgery. People do not trust strangers. Dr Amy is a stranger to Brenda.

Prove: Afraid(Brenda)

(Please try to capture the whole story with FOL and put into CNF, even if you don't use some clauses in your proof.)

(3) Suppose we add to the knowledge base for Question #2 facts/rules that state "***Patients who have chemotherapy have hair loss. Brenda has lost her hair.***" Suppose we had a system that inferred "***Brenda has had chemotherapy***" from this augmented KB.

a. Show FOL for the sentences above

b. What type of inference would this be?

c. What is problematic about this inference?