CSCI 4511/6511 - Exam Prep 4

Instructions:
This is ungraded exam prep.

1 Constraint Satisfaction

1.1 Setup

Consider an air freight terminal in which:

- Aircraft land at specific times carrying some number of cargo pallets per aircraft
- Trucks arrive at specific times to recieve the cargo, and can each carry one pallet
- Each aircraft must be assigned to arrive at a hangar at a specific time to unload cargo
  - Each aircraft must be assigned to depart from the hangar at a specific time after unloading
  - Aircraft, after arriving at a hangar, remain until unload
  - Each hangar can only accommodate one aircraft at a time
- Each truck must be assigned to arrive at a hangar at a specific time to load cargo
  - Each truck must be assigned to depart from the hangar at a specific time after loading
  - Each hangar can only accommodate one truck at a time
- Forklifts must be assigned to unload cargo pallets at a specific hangar at a specific time
  - Unloading a pallet takes 20 minutes. One forklift can unload one pallet at a time
- Forklifts must be assigned to load cargo pallets at a specific hangar at a specific time
  - Loading a pallet takes 5 minutes. One forklift can unload one pallet at a time

Given:

- Three aircraft arrive:
  - Flight 1 at 0830, carrying 2 pallets
  - Flight 2, at 0845, carrying 1 pallet
  - Flight 3, at 0905, carrying 2 pallets
- Three trucks arrive:
  - Truck 1 at 0830
  - Truck 2 at 0830
  - Truck 3 at 0840
  - Truck 4 at 0850
  - Truck 5 at 0910
- The terminal has two hangars: Hangar A and Hangar B
- The terminal has two forklifts: Forklift A and Forklift B
- All loading and unloading must start after 0830 and finish by 1000

1.2 Problem

- Assign every aircraft a hangar, arrival time, and departure time
- Assign every truck a hangar, arrival time, and departure time
- Assign each forklift a series of unload and load operations:
  - Each operation must have a hangar and a time

The complete set of assignments must result in every aircraft being unloaded and every truck being loaded.

1.3 Variables & Domains & Constraints

Enumerate variables, domains, and constraints such that a consistent assignment of values to all variables would yield a solution to the problem. You don't need to solve the problem.

(Space for answer)

2 Propositional Logic

Reframe the problem as a propositional logic problem. Enumerate all variables and constraints. You may structure your answer with "pseudocode" to create variables by looping over relevant values.

This is the back of the exam prep.