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CSCI 570 – HW5

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* **[Question 1]**

The consumption of framing word and cabinet wood was:

*Framing word: .*

*Cabinet wood:.*

But due to the shortage, this month would be:

*Framing word: .*

*Cabinet wood: .*

Therefore, let , and denote number of 1st type, 2nd type and 3rd type couches, the constraints would be:

And maximize the profit:

* **[Question 2]**

The consumption of framing word and

* **[Question 3]**

Let denote the Boolean value that indicates whether station *i* uses frequency , and let denote the Boolean value that indicates whether the frequency has been used or not.

Thus, the goal is to:

Minimize

The constraints are:

, with a fixed value of *i*. This constraint ensures one station uses one frequency.

.

and station *i* and *k* are adjacent. This constraint ensures no adjacent stations use same frequency.

* **[Question 4]**

1. False
2. XXX
3. True, because 2-SAT is in P, thus 3-SAT is in P, moreover since 3-SAT is NP-hard, so all NP can be reduced to 3-SAT, which further indicates all NP questions are in P.
4. XXX
5. False. Reduction is not commute.

* **[Question 5]**

Let *A* denotes the 3-SAT instance. The algorithm is described as below.

1. If *A* is not feasible, stop.
2. If *A* is feasible, then start from the left most literal, we do the following: assign 0 to the literal, then check is *A* still feasible. If yes, then move on, otherwise, we assign 1 to the literal and then check again. If it is still infeasible, then we stop. But if it is feasible, we move on.
3. Move on to the next literal and repeat the step 2. Keep doing until iterated all literals.

This way, after iterated all literals, we have the assignment.

* **[Question 6]**

Can use Dijkstra algorithm to find minimum path from any point *v* to the closest point on *P*.