

CSCI 338 : Computer Science Theory
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**Sample Question 2 (30-35 minutes)**

Given graph  $G = (V, E)$ , an *Independent Set* of size  $K$  is a set  $V' \subseteq V$ ,  $|V'| = K$ , such that for every  $u, v \in V'$  we have  $(u, v) \notin E$ . We learn in class that it is NP-complete. This question is about another problem called Set Packing.

INSTANCE: Collection  $C$  of finite sets, positive integer  $K \leq |C|$ .

QUESTION: Does  $C$  contain  $K$  disjoint sets?

Example.  $C = \{\{1, 3, 5\}, \{2, 3, 4\}, \{2, 4, 6\}, \{3, 6\}\}$ .  $\{1, 3, 5\}$  and  $\{2, 4, 6\}$  are the 2 disjoint sets  $C$  contains.

(2.1) Prove that Set Packing is in NP.

(2.2) Design a polynomial time reduction function which reduces (the decision version of) Independent Set to (the decision version of) Set Packing.