

Homework

due on Monday, November 9

Problem 1. Find N for which the following is true: if there are 4 topics such that any two of a group of N people share interest in one of the topics then there are three people who all are interested in the same topic. Justify your answer.

Problem 2. Find smallest number $f(n)$ for which the following statement is true: any graph with $2n + 1$ vertices and $f(n)$ edges contains three vertices such that any two of them are joined by an edge (i.e. it contains circuit of length 3). Remark: In class we showed that for graphs with even number $2n$ of vertices the analogous number is $n^2 + 1$.

Problem 3. There is exactly one road joining any 2 of n cities. Due to various constructions, each of these roads is a one way road. Suppose that whenever we can travel the road from city A to city B and the road from city B to city C then we can also travel the road from C to A . What can you say about n ?

Problem 4. There are 10 people in a party. prove that either there are three people who are mutual strangers or there are 4 people who know each other. Is the same true for 9 people?