

Quiz 1

Name:

Question 1:

Prove that for every graph G the product of its chromatic number and its independence number is at least as large as its number of vertices.

For this question you are not allowed to use any results from the lecture.

Solution:

Question 2:

Let $G = (V, E)$ be a graph and $v \in V$ a vertex. Show that if v has at least k neighbors in G and $G' = G - v$ is k -connected, then G is k -connected.

Solution:

Question 3:

Let G be a road network on which there are m factories f_1, \dots, f_m and n villages v_1, \dots, v_n . Goods need to be shipped from factories to villages on this road network. Factory f_i produces goods at rate p_i , village v_i demands goods at rate d_i and the roads all have capacity c .

Show that G can be transformed into a network G' such that all demands are satisfied if and only if the value of the max flow on G' is equal to the sum of the villages' demands.

Solution: