Problem 1

How many strings of length 10 are there that are made up of only lower case letters and contain at least one occurrence of each vowel?

Problem 2

There are 100 new teachers in the state of NJ who just finished their training and 21 high schools (say one from each of the 21 counties of NJ) in need of teachers. Of course, if the teachers are left to their own devices, they will all flock to the schools in the good counties, and so the Board of Education wants to make sure that every school gets at least one teacher assigned to it. The Board of Education wants to know in how many ways can they assign teachers to schools so that every school gets at least one new teacher assigned to it. Can you help them? You can leave you answer in the form of a sum if needed.