Homework 1

The exercises do *NOT* requite long writings. Try to be precise and to the point.

1. Let C be a set consisting of n companies, and A be a set consisting of m applicants. Consider the set $C \times A$ of all ordered pairs of the form (c, a), where $c \in C$ and $a \in A$.
   (a) How many ordered pairs are there?
   (b) Explain your answer. (Keep your answer short, you can write your explanation in at most 2-3 short sentences).
2. Solve all exercises in LN1.
3. Solve all exercises in LN2.
4. Consider the GS-algorithm. Let M be the output of the algorithm. We know (from the lecture) that M is a stable matching.

   Say that an applicant x is *unlucky according to* M if the matching M assigns company c to the applicant x so that c is the worst ranked company in the applicant's preference list. Is it possible that *all* applicant are unlucky according to M? If so, then give such an example with 3 applicants and 3 companies. If not, explain your answer in brief.
5. As above, let M be the output of the GS-algorithm. Assume that company c ranks an applicant x first; also assume that the applicant x, too, ranks c first. Does this imply that the pair (c, x) belongs to M? Answer the question as *false* or *true*, and explain your answer in brief.