In the most recent homework assignment, you were given three informally stated queries, each of which you were to translate into the language of relational algebra. Here you are to take the same three queries and express them in the language SQL. (Extra details regarding how the tuples in the results should be ordered are given below.)

Your answers should be submitted in electronic form, via e-mail, in a plain text file suitable for execution using the \i command in PostgreSQL. Send your file to mccloske@cs.uofs.edu. Links to web pages that give instructions for using PostgreSQL are found on the course web page. For the purpose of verifying the correctness of your answers, you should apply them (using PostgreSQL) to the company database, whose state corresponds to that in Figure 5.6 of Elmasri & Navathe.

In case you are unable to devise an exact translation of the query given, develop one that is "as close as possible" and point out its deficiencies.

For the purpose of making the informal queries more concise, we define the function $M$, which maps employees to sets of employees, as follows: For employees $e$ and $e'$, $e' \in M(e)$ if and only if either
    (i) $e'$ is the manager of the department for which $e$ works (according to the DNO attribute of $e$’s tuple in the EMPLOYEE relation) or
    (ii) $e$ works on a project that is controlled by the department of which $e'$ is the manager.

1. For each pair of employees $e$ and $e'$ such that $e' \in M(e)$, list the SSN and last name of $e$ and the SSN, last name, and salary of $e'$. Specify that the tuples in the result are to be in ascending order with respect to the last name of $e$.

2. For each employee $e$, list the SSN and last name of $e$, plus the number of employees in $M(e)$, the minimum of the salaries of the employees in $M(e)$, and the average of the salaries of the employees in $M(e)$. Specify that the tuples in the result are to be in descending order with respect to the third attribute (i.e., the one indicating the cardinality of $M(e)$). For tuples with the same value in the third attribute, they should be in ascending order with respect to the last name of $e$.

3. For each employee $e$ for which $M(e)$ includes at least two elements, list the SSN and ... (as in (2)). Specify that the tuples in the result are to be ordered as in (2).