Part A - SQL: Queries and Constraints

(Based on Exercise 5.4 from textbook – pg 176-177)
Consider the following relational schema. An employee can work in more than one department; the pct time field of the Works relation shows the percentage of time that a given employee works in a given department.

Emp(eid: integer, ename: string, age: integer, salary: real)
Works(eid: integer, did: integer, pct time: integer)
Dept(did: integer, dname: string, budget: real, managerid: integer)

Write the following queries in SQL:

1. Print the names and ages of each employee who works in both the Hardware department and the Software department.
2. For each department with more than 20 full-time-equivalent employees (i.e., where the part-time and full-time employees add up to at least that many full-time employees), print the did together with the number of employees that work in that department.
3. Print the name of each employee whose salary exceeds the budget of all of the departments that he or she works in.
4. Find the managerids of managers who manage only departments with budgets greater than $1 million.
5. Find the enames of managers who manage the departments with the largest budgets.
6. If a manager manages more than one department, he or she controls the sum of all the budgets for those departments. Find the managerids of managers who control more than $5 million.
7. Find the managerids of managers who control the largest amounts.
8. Find the enames of managers who manage only departments with budgets larger than $1 million, but at least one department with budget less than $5 million.
Part B - Relational Algebra

(Based on Exercise 4.2 from textbook - pg 127)

Given two relations R1 and R2, where R1 contains N1 tuples, R2 contains N2 tuples, and N2 > N1 > 0, give the minimum and maximum possible sizes (in tuples) for the resulting relation produced by each of the following relational algebra expressions. In each case, state any assumptions about the schemas for R1 and R2 needed to make the expression meaningful:

a) R1 ∪ R2

b) R1 ∩ R2

c) R1 - R2

d) R1 X R2

e) R1 / R2

Assignment Submission

• Include a copy of your answers. Pages should be stapled together at the upper left-hand corner of the page.
• Your answers should be placed in a 9 " x 12" sealed envelope. A standard assignment coverpage should be printed, signed and stapled to the front of the outside of the envelope. Note: Assignments not including a coversheet will NOT be marked.
• The submission should be placed in the Assignment Box outside of J332, in the slot labelled 2P32, before the due time indicated above. Only one submission (i.e. to the box) should be made per assignment.
• It is strongly advised that you keep all rough work. Keep this as backup until the end of the semester.