CS430/630 – Practice Midterm

For both questions, you are given the following relational schema.

```
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)
```

`managerid` values in table `Dept` correspond to `eid` values in table `Emp`.

Question 1 (10 points)

Write **relational algebra** expressions for the following queries:

(a) Find the ages of employees who work in a department named 'Catering'.
(b) Find the salaries of employees that work at least 30% of their time in departments that have budget at least $50,000.
(c) Find the salaries of department managers.
(d) Find the names of employees who work in the 'Marketing' department or who spend more than half of their time in a single department.
(e) [630 students only] Find the `eid` of managers who manage exactly one department.

Note: for this question, you are NOT ALLOWED to use SQL, answers in SQL will not receive any marks. Derive relational algebra expressions only.

Question 2 (20 points)

Write **SQL queries** for the following:

(a) Write a statement to create the table `Works`. You do NOT need to provide create table statements for the other tables. You may choose at your discretion the details of the exact SQL type for columns, as long as the category matches (e.g., integer, fractional or character type).
(b) Find the names of employees who work under the supervision of a manager named "Steve Smith".
(c) Find the ages of employees who do not work in any department with budget below $20,000.
(d) Find the age(s) of the employee(s) with the highest salary.
(e) Find the `did` and average salary over employees younger than 45 years old for each department with at least 10 employees of any age.
(f) Find the names of employees who work in all departments.

(g) [630 students only] Find the name(s) of the department(s) with the highest average salary.