

Homework 3
CS-377 Spring 2004
Due: February 16, 2004

1. (24 pts) Consider the relational database of Figure 3.39 in your textbook, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:
 - a. Find the names of all employees who work for First Bank Corporation.
 - b. Find the names and cities of residence of all employees who work for First Bank Corporation.
 - c. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000 per annum.
 - d. Find the names of all employees in this database who live in the same city as the company for which they work.
 - e. Find the names of all employees who live in the same city and on the same street as do their managers.
 - f. Find the names of all employees in this database who do not work for First Bank Corporation.
 - g. Find the names of all employees who earn more than every employee of Small Bank Corporation.
 - h. Assume the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
2. (12 pts) Consider the relation of Figure 3.21, which shows the result of the query “Find the names of all customers who have a loan at the bank.” Rewrite the query to include not only the name, but also the city of residence for each customer. Observe that now customer Jackson no longer appears in the result, even though Jackson does in fact have a loan from the bank.
 - a. Explain why Jackson does not appear in the result.
 - b. Suppose that you want Jackson to appear in the result. How would you modify the database to achieve this effect?
 - c. Again, suppose that you want Jackson to appear in the result. Write a query using an outer join that accomplishes this desire without your having to modify the database.
3. (8 pts) Using the bank example, write relational-algebra queries to find the accounts held by more than two customers in the following ways:
 - a. Using an aggregate function.
 - b. Without using any aggregate functions.