

# CS 561-C – Quiz #1

October 15, 2024 (Tuesday)

NAME: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

## Introduction:

This quiz is worth 100 points, and you have 15 minutes to finish the quiz. This quiz is closed book and closed notes.

## Questions:

1. (20 pts.) Describe the characteristics of "super keys" that are NOT "candidate keys".

2. (30 pts.) Using the following schemas:

- ✓ **branch** (branch\_name, branch\_city, assets)
- **customer** (customer\_name, customer\_street, customer\_city)
- **account** (account\_number, branch\_name, balance)
- ✓ **loan** (loan\_number, branch\_name, amount)
- **depositor** (customer\_name, account\_number)
- ✓ **borrower** (customer\_name, loan\_number)

Write the following query in SQL (15 pts) and relational algebra (15 pts):

"Find the branch names and customer names for the customers who have loans from the branches in NYC and loans greater than \$15 000."

~~SQL~~: (15 pts)

~~Relational Algebra~~: (15 pts)

3. (30 pts.) Rewrite the following expression without using division ( $\div$ ):

$$\Pi_{customer\_name, branch\_name} (depositor \bowtie account) \div \rho_{temp(branch\_name)} (\{("Downtown"), ("Uptown")\})$$

4. (20 pts.) In OLTP, we prefer to have a table (relation) to contain information about 1 and only 1 thing (entity). What happens if we store more than 1 thing in a table? And why? Also, define what we mean by 1NF.