# Metro State University
# ICS-311-50 Summer 2023
# Class Assignment 1

**Question 1 ( 5 Points)**

Given the following database instance, answer the questions below.

**Employee**

| emp_code | emp_lname | job_code |
|---|---|---|
| EC14 | Rudell | JC4 |
| EC15 | McDade | JC1 |
| EC16 | Ruellardo | JC1 |
| EC17 | Smith | JC3 |
| EC20 | Smith | JC2 |

**Plan**

| plan_code | plan_description |
|---|---|
| 1 | Term Life |
| 2 | Stock Purchase |
| 3 | Long-term disability |
| 3 | Extra Week Of PTO |
| 4 | Dental |

**Job**

| job_code | job_description |
|---|---|
| JC1 | Clerical |
| JC2 | Technical |
| JC3 | DBA |
| JC4 | Manager |

**Benefit**

| emp_code | plan_code |
|---|---|
| EC15 | 3 |
| EC16 | 1 |
| EC17 | 1 |
| EC17 | 3 |
| EC17 | 4 |
| EC20 | 3 |

**Extra_Benefit**

| job_code | plan_code |
|---|---|
| JC4 | 2 |

Assume that the following attributes are the primary keys for the tables:

emp_code is the primary key for **Employee** table
job_code is the primary key for the **Job** table
plan_code is the primary key for the **Plan** table
emp_code, plan_code is a composite primary key for the **Benefit** table
job_code, plan_code is the composite primary key for the **Extra_Benefit** table

a) Do all tables exhibit entity integrity? Answer yes or no and then explain your answer. ( 2.5 Points)

**Characteristics of Entity Integrity: The primary key uniquely identifies each row and shouldn't be null value.**

b) For each table in the database, identify foreign key(s) (if any). For each foreign key, state the referencing relation and the referenced relation. ( 2.5 Points)

**Foreign Key is an attribute in one table and value refer to an attribute of another referenced relation (table).**

**Question 2 ( 5 Points)**

Given the following relational database schema (primary keys are bold and underlined). Answer the questions below:

*branch(**branch_id**, branch_name, branch_city, assets)*
*customer(**customer_id**, customer_name, custome_str, customer_city, customer_st, customer_zip)*
*loan(**loan_number**, branch_id, amount)*
*borrower(**customer_id**, **loan_number**)*
*account(**account_number**, branch_id, balance)*
*depositor(**customer_id, account_number**)*

a) Devise a reasonable database instance by filling the tables with data of your choice. Make sure to have at least 3 tuples in each table. Make sure that all tables exhibit entity integrity and referential integrity constraints. Make sure to use good table layout in your answer. (3 points )

b) For each of the following relational algebra expressions, explain the output of the expression in words: ( 1 point)

- $\Pi_{\text{branch\_name, branch\_city}}(\sigma_{\text{assets} > 102000.00}(\text{branch})$

c) For each of the following queries, write a relational algebra expression to answer the query: (1 point)

- Find the names of all customers who live in Brewster, and have the name Hopkins.