University of Toronto
CSC343, Winter 2017

Relational Model Exercises

1. Consider this schema:

   One(this, that, other)

   Two(tweedledee, tweedledum)

   One[this] $\subseteq$ Two[tweedledee]

   Suppose relation *One* has 20 tuples. What do we know about the number of tuples in *Two*? Circle the one statement below that is the strongest thing we can be certain of.

   (a) The number of tuples in relation *Two* must be >= 20.
   (b) The number of tuples in relation *Two* must be <= 20.
   (c) The number of tuples in relation *Two* must be 20.
   (d) The number of tuples in relation *Two* must be >= 1.
   (e) The number of tuples in relation *Two* must be >= 0.

2. Recall the Movies schema:

   Movies($\underline{\text{mID}}$, title, director, year, length)
   Artists($\underline{\text{aID}}$, aName, nationality)
   Roles($\underline{\text{mID, aID, character}}$)

   Roles[mID] $\subseteq$ Movies[mID]
   Roles[aID] $\subseteq$ Artists[aID]

   Suppose we add this constraint: Movies[mID] $\subseteq$ Roles[mID]

   (a) Make a very small instance of the database that violates this constraint but otherwise satisfies the schema. You will only need one or two rows.

   (b) Restate this constraint in plain English.

   (c) Is this a foreign-key constraint? Explain.

3. Are the following expressions equivalent?

$$\Pi_{director,length}(\sigma_{length>140}Movies)$$

$$\sigma_{length>140}(\Pi_{director,length}Movies)$$

   That is, do they have the same value for all possible instances of our schema?

   (a) Yes. In fact, you can *always* reverse a project and a select and get an equivalent expression.

   (b) Yes, these two are equivalent. But you cannot always reverse a project and a select and get an equivalent expression. It depends on the circumstances.

   (c) No. They do not they have the same value for all possible instances.

   (d) These are not both valid expressions, so we can't even discuss whether or not they are equivalent!