Cal Poly Spring 2016	**CPE/CSC 365** Introduction to Database Systems	Eriq Augustine

Homework
Basic Relational Algebra

Set Builder Notation

Expand the set builder expressions for the set X into long form sets. You can assume we are working with only non-negative integers. If the answer is an infinite set, show enough of the set to capture the pattern.
Ex: $X = \{x | x\%3 = 0\}$
Solution: $X = \{0, 3, 6, 9, ...\}$

$X = \{(x, x + 1)\}$

$X = \{$

$X = \{x | x > 4 \text{ and } x \leq 8 \text{ and } x \neq 5\}$

$X = \{$

Given: $A = \{a | 0 < a < 5\}$ and $B = \{b | b \geq 3 \text{ and } b < 6\}$
$X = \{x | x \in A \text{ and } x \notin B\}$

$X = \{$

Relational Notation To SQL

Generate the CREATE TABLE statements for the following relations. For variatic types (like string types), guess a reasonable value for the size of the type.

Students(id:INT, email:STRING, firstName:STRING, lastName:STRING)

Authors(authorId, authorLastName, authorFirstName, address, city, state, zip)

Dogs(type, cuteness, hugability, weight, height, age, favoriteFood)

Basic Relation Operations

Compute the given operation on the pair of relations and diagram the resulting relation. Make sure to remember to include the names of the attributes.

Union ($\cup$)

R:
A
1
2
3

$\cup$

A:
C
3
4
5

$=$

R:	
A	B
1	a
2	b
3	c

$\cup$

A:
C
a
b
c

$=$

Difference ($-$)

R:
A
1
2
3

$-$

A:
C
3
4
5

$=$

R:
A
3
4
5

$-$

A:
C
1
2
3

$=$

Cartesian Product ($\times$)

R:
A
1
2
3

$\times$

S:
A
Z
X
Y

$=$

R:	
A	B
1	a
2	b
3	c

$\times$

S:
A
Z
X
Y

$=$

Students

Consider the following table of students:

Students:

id	lastName	firstName	unitsCompleted	quartersCompleted	gpa
1	Anderson	Alex	50	5	3.2
2	Cooper	John	180	15	3.9
3	Smith	Jane	140	10	2.2
4	Doe	Aldrin	80	5	1.2
5	Williams	Kim	20	1	2.9

Write the relational algebra statement for each operation.

Rename (ρ)

- Rename the Students relation to "CSCStudents".

- Keep the relation called "Students", but rename the attributes so that they are all caps with underscores separating the words.

Projection (π)

- Project Students so that only the name (first, last) is left.

Selection (σ)

- Find all the students that have completed more than five quarters.

- Find all the students with even id numbers.

- Find all the students that have complete an average of at least 16 units a quarter.

- Find the last name of the student with the highest gpa. For this problem, I will allow you to use a function called MAX which finds the maximum of a set. However, it can be done without MAX.

- Find the first and last names of all the students who have either completed more than 100 units and have less than a 3.0 gpa, or have completed less than 100 units with less than a 2.0 gpa.