

# Worksheet 7: Normalization

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**Question 1:** You are given an instance and the following rules for a relation called Tutor. Assume that the key is (StudentName, Course).

- A tutor charges the same tuition fees from all students
- A tutor can teach only one course (e.g. Ritu can teach only 1 subject (Math))
- A student can be taught a course by one tutor only.

StudentName	StudentYearOfBirth	Course	Tutor	TuitionFees (per hour)
Harry	2005	Math	Ritu	\$25
Ellen	2008	Physics	Dan	\$35
Ansh	2005	English	Larry	\$40
Gloria	2006	Math	Ritu	\$25
Harry	2005	Computer Science	Christie	\$30

1a. The following statements are written to add more data to the existing relation Tutor. Which of the following statement or statements describe an insertion anomaly:

Statement1: Gary was born in 2000.

Statement2: Gary is taught Math by Ritu.

Statement3: Cathie charges \$30 per hour to teach Math.

1b. Find all functional dependencies of Tutor.

1c. Is Tutor in 1NF? Justify.

1d. Is Tutor in 2NF? Justify.

**Question 2:** Given CUSTOMER (CustomerID, Name, Street, City, State, Zip, Phone)

<u>CustomerID</u>	Name	Street	City	State	Zip	Phone
C101	Smith Harry	123 Ridgeland	Oakville	ON	L9M 2P4	416-555-1212
C102	Arthur Weasley	11 Nova Street	Sherbrooke	PQ	J1C 0A1	819-555-1212

- List all non-full functional dependencies in CUSTOMER, if any.
- Prove that CUSTOMER is in 2NF.
- Is CUSTOMER in 3NF? If not, decompose it into smaller relations such that the resulting relations are in 3NF.