

# CSE 370– Database Systems

## Assignment 2

Fall 2023

### Submission Instructions:

1. Write your name, id, section on top of the first page
2. Your answer should be handwritten, take pictures and create a single pdf.
3. **Submit the pdf in the following form:** <https://forms.gle/96D5wcmyLhcRRpVi7>
4. **Submission Deadline:** 1st December, 2023(Friday) 11:59 pm (midnight)
5. **NO LATE SUBMISSION WILL BE ACCEPTED**

### Question 1

[10 Marks]

X	Y	Z	A
abcefg	1	q	10
xyz	2	p	11
feg	3	q	12
xyz	2	p	13
abcdefg	3	q	10

State which of the following dependencies are valid and which are not. For each dependency, briefly write the reasons. The first one is explained and solved for you:

A.  $XY \rightarrow A$

Functional dependency is valid if for the same value of XY, the corresponding value of A is also the same. Here (“xyz”, 2) is the repeated value for X and Y in row 2 and 4. The corresponding value in A is 11 and 13 respectively, therefore this functional dependency is not valid according to the definition of FD. [Note: if all values of XY were unique, i.e. no repetition, then the FD will be valid as it does not contradict the definition of FD]

B.  $X \rightarrow YZ$

C.  $A \rightarrow XYZ$

D.  $YZ \rightarrow X$

E.  $Y \rightarrow Z$

**Question 2[CO4]**

**[10 Marks]**

Consider the following relation:

Computer\_Repair(Comp\_ID, Engineer\_ID, Date\_Assigned, Customer\_name, Customer\_phone, Engineer\_Name, Engineer\_phone, Date\_Repaired, Issue, Priority\_Level, Service\_Charge, Commission\_Percentage, Total\_Repairs)

The primary key of the relation is underlined

The relation has the following additional functional dependencies:

FD1: Engineer\_ID  $\rightarrow$  Engineer\_Name, Total\_Repairs, Commission\_Percentage, Engineer\_phone

FD2: Comp\_ID, Date\_Assigned  $\rightarrow$  Issue, Priority\_Level, Service\_Charge

FD3: Comp\_ID  $\rightarrow$  Customer\_name, Customer\_phone

FD4: Priority\_Level  $\rightarrow$  Service\_Charge

FD5: Total\_Repairs  $\rightarrow$  Commission\_Percentage

- i. Explain if this is in 1NF or not. If not, apply normalization to decompose it to 1NF. [2]
- ii. Explain if this is in 2NF or not. If not, apply normalization to decompose it to 2NF. [4]
- iii. Explain if this is in 3NF or not. If not, apply normalization to decompose it to 3NF [4]