

Directed work 1 (TD)

FDs (Functional Dependencies)

Exercise 1

Consider the relation and the following 05 tuples

Tutor	Department	Faculty	HeadOfDept	Course
Thomson	Math	Engineering	Jackson	Statistic
Thomson	Math	Engineering	Jackson	Number Theory
Robinson	Physics	Engineering	Jackson	Statistic
Robinson	Physics	Science	Johnson	Statistic
MacKay	Physics	Science	Johnson	Relativity

- 1- Among the following dependencies, which ones are valid?
 - HeadOfDept \rightarrow Faculty
 - Faculty \rightarrow Department
 - Department \rightarrow Faculty
 - Course \rightarrow Tutor

- 2- Provide the other possible FDs.

Exercise 2

In the following figure, let's consider the relation representing information about a company's products. Given: the component type of a product (Type attribute), the quantity of the component required for a product (Quantity attribute), the unit price of the component of a product (PriceOfC attribute), the supplier of the component (Supplier attribute), and the total price of the individual product (PriceOfP attribute).

Product	Component	Type	Quantity	PriceOfC	Supplier	PriceOfP
Bookcase	Wood	Walnut	5	10.00	Smith	400
Bookcase	Screw	B212	200	0.10	Brown	400
Bookcase	Glass	Crystal	3	5.00	Jones	400
Seat	Wood	Oak	5	15.00	Smith	300
Seat	Screw	B212	250	0.10	Brown	300
Seat	Screw	B414	150	0.30	Brown	300
Desk	Wood	Walnut	10	8.00	Quasimodo	250
Desk	Handle	H621	10	20.00	Brown	250
Table	Wood	Walnut	4	10.00	Smith	200

- Identify the minimal functional dependencies (FDs) and the key(s) of the relation.

Exercise 3

Given the set of functional dependencies F on the relation $R(ABCDEI)$ as follows

$$\text{Let } F = \{A \rightarrow D, AB \rightarrow E, BI \rightarrow E, CD \rightarrow I, E \rightarrow C\}$$

- Calculate the closure $\{A, E\}^+$ on R .

Exercise 4

Consider the following relation $R(ABCDEF)$ and F the set of functional dependencies FDs

$$A \rightarrow BC$$

$$B \rightarrow E$$

$$CD \rightarrow EF$$

- 1- Prove that $AD \rightarrow F \in F^+$
- 2- Calculate the closure $\{A, B\}^+$
- 3- Find a candidate key for R

Exercise 5

F et G are two set of FDs

$$F = \{A \rightarrow BC, A \rightarrow D, CD \rightarrow E\}, \text{ and}$$

$$G = \{A \rightarrow BCE, A \rightarrow ABD, CD \rightarrow E\}$$

- Are F and G equivalent?