Normalization exercises

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Note: For each of the following exercises complete the following tasks:

1. (Complete after lesson 1) Find what normal form each of the following tables satisfies.Motivate the answer according the definition of normal forms seen in class.
2. (Complete after lesson 2) Apply the normalization algorithms seen in class to each table. Use intermediate refinements, i.e. if the table is in 1NF first normalize in 2NF and, if necessary, in BCNF.

Exercise 1 - Lockers The attribute `locker` is multivalued and id is unique within the multivalue attribute.

locker					
<u>teacher_id</u>	name	surname	locker		
			id	key_num	size

Exercise 2 - Library The attribute `borrowed_books` is multivalued and the combination { `author,title,date` } is unique within this attribute. Furthermore, the functional dependency `date` → `return_date` is defined on the table.

library						
<u>card_num</u>	name	surname	borrowed_books			
			author	title	date	return_date

Exercise 3 - Books The following functional dependencies are defined on the table:

- `author` → `author_bdate`
- `title` → `genre,pages,section`

books					
<u>author</u>	<u>title</u>	books	author_bdate	pages	section

Exercise 4 - Houses The following functional dependencies are defined on the table:

- `postal_code` → `address,price,size`
- `owner` → `owner_account`

houses							
owner	postal_code	address			price	size	account
		city	street	number			

Exercise 5 - Port The following functional dependencies are defined on the table:

- `ship_name` → `docked_at,country,weight,class`
- `docked_at` → `country`
- `captain` → `cpt_license`

port						
ship_name	captain	cpt_line	weight	class	docked_at	country

Exercise 6 - Cellar The following functional dependencies are defined on the table:

- `producer` → `country,location`
- `wine` → `bottling_date,price/l,grape_variety`
- `location` → `country`
- `grape_variety` → `price/l`

Cellar						
producer	wine	bottling_date	price/l	country	location	grape_variety

Exercise 7 - Courses The following functional dependencies are defined on the table:

- `employee_code` → `name,surname`
- `study_points` → `hours`
- `course_code` → `hours`
- `course_code` → `study_points`

courses						
employee_code	name	surname	study_points	hours	course_code	course_name

Exercise 8 - Flights The following functional dependencies are defined on the table:

- `departure,arrival` → `flight_duration`
- `captain_code` → `captain_name`
- `flight_code` → `captain_name`
- `flight_code` → `captain_code`

flights						
flight_code	plane_model	departure	arrival	flight_time	captain_name	captain_code

Exercise 9 - Buildings The following functional dependencies are defined on the table:

- `material` → `maximum_pressure,specific_weight`
- `building_length,building_width,building_height` → `tax_rate`
- `building_type_code` → `building_length,building_width,building_height`

buildings					
building_type_code	component_type	material	building_length	building_width	building_height
tax_rate		maximum_pressure		specific_weight	