

Charles Nguyen -- 011606177

CptS 451 HW5

Question 1: Identifying Functional Dependencies

There are two BCNF tables:

MySales_product

SQL

```
SELECT COUNT(*) FROM (SELECT DISTINCT pname FROM mysales) AS MS1;  
SELECT DISTINCT pname, price FROM mysales;
```

SQL

```
CREATE TABLE mysales_product (  
    pname TEXT,  
    price INTEGER  
);  
  
INSERT INTO mysales_product (pname, price)  
SELECT pname, price FROM mysales;  
  
SELECT COUNT(*) FROM mysales_product;
```

MySales_monthly_discount

SQL

```
SELECT COUNT(*) FROM (SELECT DISTINCT month FROM mysales) AS MS2;  
SELECT DISTINCT month, discount FROM mysales;
```

SQL

```
CREATE TABLE mysales_monthly_discount (  
    month TEXT,  
    discount TEXT  
);  
  
INSERT INTO mysales_monthly_discount (month, discount)  
SELECT month, discount FROM mysales;  
  
SELECT COUNT(*) FROM mysales_monthly_discount;
```

Question 2: BCNF Decomposition

Part 1.

$R(A, B, C, D, E, F)$

$A \rightarrow BC$ (1)

$D \rightarrow AF$ (2)

- decompose R
 - (1) $\{A\}^+ = \{A, B, C\}$
 - A is not a key
 - not in BCNF
 - compute $R_1(A, B, C)$
 - A is the key
 - (2) $\{D\}^+ = \{D, A, B, C, F\}$
 - D is not a key
 - not in BCNF
 - compute $R_2(A, B, C, D, F)$
 - D is the key

B, C, E are not on the LHS, safely ignored.

	A	B	C	D	E	F
A		B	C			
D	A					F

Applying reflexivity.

	A	B	C	D	E	F
A	A	B	C			
D	A			D		F

Applying transitivity.

	A	B	C	D	E	F
A	A	B	C			
D	A	B	C	D		F

- $\{A\}^+ = \{A, B, C\}$
 - Add E
 - $\{A, E\}^+ = \{A, B, C, E\}$
 $\{A, E\}$ is the key.
- $\{D\}^+ = \{A, B, C, D, F\}$
 - Add E
 - $\{D, E\}^+ = \{A, B, C, D, E, F\}$
 $\{D, E\}$ is the key.

Part 2.

$$\begin{aligned} S(A, B, C, D) \\ ABC \rightarrow D & \quad (1) \\ D \rightarrow A & \quad (2) \end{aligned}$$

	A	B	C	D
A				
ABC				D
B				
C				
D	A			

Applying reflexivity.

	A	B	C	D
A	A			
ABC	A	B	C	D
B		B		
C			C	
D	A			D

Applying transitivity.

	A	B	C	D
A	A			
ABC	A	B	C	D
B		B		
C			C	
D	A	B	C	D

- $\{A, B, C\}^+ = \{A, B, C, D\}$ *key*, in BCNF
- $\{D\}^+ = \{D, A\}$ *not in BCNF*