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.

$$
\begin{aligned}
&R(A, B, C, D, E, F) \\
&A \rightarrow BC && (1) \\
&D \rightarrow AF && (2)
\end{aligned}
$$

- decompose R
  - (1) $\{A\}^+ = \{A, B, C\}$
    - A is not a key
    - not in BCNF
    - compute $R1(A, B, C)$
      - A is the key
  - (2) $\{D\}^+ = \{D, A, B, C, F\}$
    - D is not a key
    - not in BCNF
    - compute R2(A,B,C,D,F)
      - D is the key

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

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

Applying reflexivity:
R	A	B	C	D	E	F
A	A	B	C			
D	A			D		F

Applying transivity:
	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.

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

	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 transivity:
	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*
- $\{D\}^+ = \{D, A\}$ *not in BCNF*