

Q1

Q 1.1

List items available in both “red” and “blue”.

$$\pi_{item}(\sigma_{color=red}(Types)) \cap \pi_{item}(\sigma_{color=blue}(Types))$$

Q 1.2

List the name of the employees making at least as much as “Jane”. If there are several employees named “Jane”, which Jane’s salary is used in this comparison in your answer?

$$\pi_{name}(\sigma_{salary \geq \pi_{salary}(\sigma_{name=Jane}(Employee))}(Employee))$$

If there are several employees named “Jane”, the highest Jane’s salary is used in this comparison.

Q 1.3

Find the largest salary paid to any employees.

$$n = \pi_{name,salary}(Employee)$$

$$C = P(C(1 \rightarrow n1, 2 \rightarrow s1, 3 \rightarrow n2, 4 \rightarrow s2), n * n)$$

Solution:

$$\pi_{name}(Employee) - \pi_{n1}(\sigma_{s1 < s2}(C))$$

Q 1.4

What departments sell every item with a red color.

$$\pi_{dept,item}(Sales) / \pi_{item}(\sigma_{color=red}(Types))$$

Q 1.5

What departments sell only items with a red color, in other words, what departments do not sell any item with a non-red color.

$$\pi_{dept}(Sales \bowtie Types) - \pi_{dept}(Sales \bowtie \sigma_{color \neq red}(Types))$$

Q2

Q 2.1

List items available in both “red” and “blue”.

```
1 SELECT t.item
2 FROM Types t
3 WHERE t.color = 'blue'
4 INTERSECT
5 SELECT t.item
6 FROM Types t
7 WHERE t.color = 'red'
```

Q 2.2

List the name of the employees making at least as much as “Jane”. If there are several employees named “Jane”, which Jane’s salary is used in this comparison in your answer?

```
1 SELECT E1.name
2 FROM Employee E1, Employee E2
3 WHERE E1.salary >= E2.salary AND E2.name = 'Jane'
```

Q 2.3

Find the largest salary paid to any employees.

```
1 SELECT MAX(salary)
2 FROM Employee;
```

Q 2.4

What departments sell every item with a red color.

```
1 SELECT DISTINCT s.dept
2 FROM sales s
3 WHERE NOT EXISTS (
4     SELECT t.item
5     FROM types t
6     WHERE t.color = 'red'
7     EXCEPT
8     SELECT s1.item
9     FROM sales s1
10    WHERE s1.dept = s.dept
11 )
```

Q 2.5

What departments sell only items with a red color, in other words, what departments do not sell any item with a non-red color.

```
1  SELECT DISTINCT s.dept
2  FROM sales s
3  EXCEPT
4  SELECT DISTINCT s.dept
5  FROM sales s
6  WHERE s.item IN (
7      SELECT t.item
8      FROM types t
9      WHERE t.color != 'red'
10 )
```

Q3

Q 3.1

Express query 1 in SQL without using INTERSECT

```
1  SELECT t.item
2  FROM Types t
3  WHERE t.color = 'blue' AND t.item IN (
4      SELECT t1.item
5      FROM Types t1
6      WHERE t1.color = 'red'
7  )
```

Q 3.2

Express query 2 in SQL using nested query

```
1  SELECT E1.name
2  FROM Employee E1
3  WHERE E1.salary >=(
4      SELECT MAX(E2.salary)
5      From Employee E2
6      WHERE E2.name = "Jane"
7  )
```

Q 3.3

Express query 3 without using EXCEPT

```
1  SELECT e.salary
2  FROM Employee e
3  WHERE e.salary = (
4      SELECT MAX(e2.salary)
5      FROM Employee e2;
6  )
```

Q 3.4

Express query 5 without using EXCEPT

```
1  SELECT DISTINCT s.dept
2  FROM sales s
3  WHERE s.dept NOT IN (
4      SELECT s1.dept
5      FROM sales s1
6      WHERE s1.item IN (
7          SELECT t.item
8          FROM types t
9          WHERE t.color != 'red'
10     )
11 )
```