Exercise 1: (3 pts)
Give the SQL-query that finds the city (city name) that has the maximum average of gas consumption. Its average of gas consumption should be part of the result as well.

Exercise 2: (2 pts)
For each of the following SQL-queries, indicate which of the tables $E_i$ are the results when executing the respective query.

- (1) SELECT A FROM R NATURAL JOIN S
- (2) SELECT A FROM R NATURAL JOIN S GROUP BY A
- (3) SELECT DISTINCT A FROM R LEFT OUTER JOIN S ON R.B = S.B
- (4) SELECT DISTINCT A FROM R RIGHT OUTER JOIN S ON R.B = S.B

Exercise 3: (3 pts)
Consider the following SQL query $Q$:

```sql
SELECT COUNT(*) AS NUM
FROM (SELECT * FROM T WHERE A NOT IN (SELECT B FROM T))
```

a) Consider the following instance \( t_1 \) from \( T \):

\[
\begin{array}{cc}
A & B \\
1 & 2 \\
2 & null \\
4 & 4 \\
3 & 1 \\
\end{array}
\]

Give the result of \( Q \) on \( t_1 \). Justify your answer.
b) Consider now the following instance \( t_2 \) from \( T \):

\[
\begin{array}{cc}
A & B \\
1 & 2 \\
2 & 2 \\
null & 4 \\
3 & 1 \\
\end{array}
\]

Give the result of \( Q \) on \( t_2 \). Justify your answer.

**Exercise 4: (2pts)**

Explain why the following queries are wrong. Give, for each, the corresponding correct SQL-query.

a) List the names of all cities with the number of their buildings.
   
   ```sql
   SELECT name, count(*) AS building_count
   FROM citya natural JOIN building
   GROUP BY cityid
   ORDER BY building_count DESC;
   ```

b) The city with the maximum population along with its id.
   
   ```sql
   SELECT MAX(population), cityid
   FROM citya ;
   ```