Task 2 (3 marks)
An objective of this task is to write implementation of the queries as the relational algebra expressions

Consider the following queries related to the relational tables included in `tpchr` sample database.

(1) Find the names of parts (`P_NAME`) shipped by a supplier `Golden Bolts` (`S_NAME`).

(2) Find the names of parts together with the names of suppliers. If a supplier has the same name as a name of part then list such name only one time.

(3) Find the names of parts (`P_NAME`) not shipped by any supplier.

Write the implementations of the queries listed above as expressions of the relational algebra and as `SELECT` statements.

Save the relational algebra expressions implanting the queries listed above in a file `solution2.pdf`.

Deliverables
A file `solution2.pdf` that contains implementation of the queries listed above as the expressions of the relational algebra. The handwritten and scanned/photographed implementations of the queries are acceptable.

Solutions

(1) Find the names of parts (`P_NAME`) shipped by a supplier `Golden Bolts` (`S_NAME`).

$$\pi_{p\_name}(\sigma_{s\_name = 'golden\ bolts'}((PART \bowtie_{p\_partkey = ps\_partkey} PARTSUPP) \bowtie_{s\_suppkey = ps\_suppkey} SUPPLIER)$$

```
SELECT p_name
FROM PART JOIN PARTSUPP
          ON p_partkey = ps_partkey
          JOIN SUPPLIER
          ON s_suppkey = ps_SUPPKEY
WHERE SUPPLIER.s_name = 'Golden Bolts';
```

(2) Find the names of parts together with the names of suppliers. If a supplier has the same name as a name of part then list such name only one time.

$$\pi_{p\_name}(PART) \cup \pi_{s\_name}(SUPPLIER)$$

```
SELECT p_name
FROM PART
UNION
SELECT s_name
FROM PART;
```

(3) Find the names of parts (P_NAME) not shipped by any supplier.

π_{p_name}(PART~ p_partkey = ps_partkey PARTSUPP)

```
SELECT p_name
FROM PART
WHER PART.p_partkey NOT IN (SELECT ps_partkey
                            FROM PARTSUPP);
```

End of sample solution