Consider the following schema, where the key field(s) are underlined (e.g., sid is the key for Supplier), and the domain of each field is listed after the italicized field name. The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in the indicated language (either the tuple relational calculus, denoted TRC, or SQL).

Suppliers (sid: integer, sname: string, address: string)
Parts (pid: integer, pname: string, color: string)
Catalog (sid: integer, pid: integer, cost: decimal(8,2))

1) [SQL] Find the pnames of parts for which there is some supplier. (2 Pts)

```sql
SELECT DISTINCT p.pname
FROM Parts p, Catalog c
WHERE p.pid = c.pid
```

Alternative (one of several :-)):

```sql
SELECT DISTINCT p.pname
FROM Parts p
WHERE EXISTS
    (SELECT * FROM Catalog c
     WHERE c.sid = p.sid
     AND c.cost < 100
     AND (EXISTS (SELECT * FROM Parts p
                     WHERE p.pid = c.pid
                     AND p.color = 'yellow')))
```

2) [TRC] Find the snames of Suppliers who supply a yellow part that costs < 100. (2 Pts)

```trc
{t(sname) | \( \exists s \in \text{Suppliers} (t.sname = s.sname \land \\
             (\exists c \in \text{Catalog} (c.sid = s.sid \land c.cost < 100 \land \\
              (\exists p \in \text{Parts} (p.pid = c.pid \land p.color = 'yellow')))))}
```
SQL:
SELECT DISTINCT sname
FROM Suppliers s, Catalog c, Parts p
WHERE s.sid = c.sid AND c.pid = p.pid AND p.color = 'yellow' AND c.cost < 100;

3) [SQL] Find the sids of suppliers who supply a yellow part and a blue part. (2 Pts)

SELECT c.sid
FROM Catalog c, Parts p
WHERE c.pid = p.pid AND p.color = 'yellow'
INTERSECT SELECT c1.sid
FROM Catalog c1, Parts p1
WHERE c1.pid = p1.pid AND p1.color = 'blue'

Alternative (MySQL):

SELECT sid1.sid FROM (SELECT c.sid
FROM Catalog c, Parts p
WHERE c.pid = p.pid AND p.color = 'yellow') AS sid1
JOIN (SELECT c1.sid
FROM Catalog c1, Parts p1
WHERE c1.pid = p1.pid AND p1.color = 'blue') AS sid2
ON sid1.sid = sid2.sid;

4) [TRC] Find the snames of suppliers who supply ONLY purple parts. (2 Pts)

{t(sname) | ∃ s ∈ Suppliers (t.sname = s.sname ∧
(∃ c IN Catalog
(∃ p IN Parts (s.sid = c.sid ∧ c.pid = p.pid ∧
p.color ≠ 'purple'))))}

SQL:
SELECT DISTINCT S.sname
FROM Suppliers S
WHERE S.sid NOT IN (SELECT C1.sid
FROM Parts P, Catalog C1
WHERE C1.pid = P.pid
AND p.color <> 'purple')
5) [SQL] Find the sid of a supplier who supplies the most expensive red part along with the pname of the part. (2 Pts)

SELECT  c.sid, p.pname
FROM Catalog c, Parts p
WHERE c.pid = p.pid AND p.color = 'red' ORDER BY c.cost DESC limit 1;