1) Does Q1 contain a subquery?

Q1: SELECT * FROM Lineup
    WHERE band_id = (SELECT id FROM Band
                    WHERE name = 'Asleep at the Wheel')

A. Yes
B. No
2) What is the output from Q2’s subquery when run against the tables shown?

Q2: SELECT venue_id FROM Lineup WHERE band_id = (SELECT id FROM Band WHERE name = 'Blushing')

A. NULL B. 'blu' C. 'pclub'
3) How many records does Q3 return?

Q3: SELECT venue_id FROM Lineup WHERE band_id =
    (SELECT id FROM Band WHERE name = 'Western Youth')

A. 1          B. 2          C. 6
4) What inputs are passed to the outer query of Q4?

Q4: SELECT venue_id FROM Lineup WHERE band_id =
(SELECT id FROM Band WHERE genre = 'Rock')

<table>
<thead>
<tr>
<th>Lineup</th>
<th>Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>id</td>
</tr>
<tr>
<td>1</td>
<td>bor</td>
</tr>
<tr>
<td>2</td>
<td>blu</td>
</tr>
<tr>
<td>3</td>
<td>wy</td>
</tr>
<tr>
<td>4</td>
<td>db</td>
</tr>
<tr>
<td>5</td>
<td>aw</td>
</tr>
</tbody>
</table>

A. 'blu'  B. 'wy'  C. {'blu', 'wy'}
5) The queries Q5 and Q6 are functionally equivalent based on the table definitions given.

Lineup(id, date, time, length, venue_id, band_id)
Band(id, name, genre)

Q5: SELECT id, date, time, length, venue_id
    FROM Lineup WHERE band_id IN
    (SELECT id
     FROM Band
     WHERE name = 'Asleep at the Wheel')

Q6: SELECT l.id, l.date, l.time, l.length, l.venue_id
    FROM Lineup l
    JOIN Band b ON l.band_id = b.id
    WHERE b.name = 'Asleep at the Wheel'

A. True
B. False
Scalar Subqueries: WHERE clause

SELECT a, b, c
FROM T1
WHERE a =
    (SELECT x FROM T2 ...)

Comparison Operators: =, !=, >, <, <=, >=
Practice Question

Who are the oldest students?

Student(sid, fname, lname, dob)
Class(cno, cname, credits)
Teacher(tid, fname, lname, dept)
Takes(sid, cno, grade)
Teaches(tid, cno)
Scalar Subqueries: **HAVING** clause

```sql
SELECT a, b, c <aggregate functions>
FROM T1
[WHERE <boolean condition>]
GROUP BY a, b, c
HAVING <aggregate function> = (SELECT x
                                 FROM T2 ...)
```

Comparison Operators:  = != > < <= >=
Practice Question

Which classes have a higher enrollment than the overall average enrollment per class?

Student(sid, fname, lname, dob)
Class(cno, cname, credits)
Teacher(tid, fname, lname, dept)
Takes(sid, cno, grade)
Teaches(tid, cno)
List Subqueries: **WHERE** clause

```sql
SELECT a, b, c
FROM T1
WHERE d IN
     (SELECT x FROM T2 ...)
```

**List Membership Operators:**

- IN
- NOT IN
Practice Question

Who does not take CS327E?

Is this query a correct implementation?

```
SELECT sid
FROM Takes
WHERE cno != 'CS327E'
```
Practice Question

Who takes only CS313E?

Student(sid, fname, lname, dob)
Class(cno, cname, credits)
Teacher(tid, fname, lname, dept)
Takes(sid, cno, grade)
Teaches(tid, cno)
List Subqueries: FROM clause

SELECT a, b, c
FROM (SELECT a, b, c FROM ...)
[WHERE]
[ORDER BY]
Correlated Subqueries

```
SELECT a, b, c
FROM T1
WHERE d > (SELECT y FROM T2 WHERE T1.a = T2.x)
```

Comparison Operators:  =, !=, >, <, <=, >=
Practice Question

Which teachers earns more than the average salary in their department?
Correlated Subqueries: \textbf{EXISTS}

\begin{align*}
\text{SELECT} & \ a, \ b, \ c \\
\text{FROM} & \ T1 \\
\text{WHERE} & \ \textbf{EXISTS} \\
& \ (\text{SELECT} \ x \ \text{FROM} \ T2 \ \text{WHERE} \ T1.a = T2.x)
\end{align*}

\begin{itemize}
\item \textbf{Existential Quantifiers:}
\item \textbf{EXISTS}
\item \textbf{NOT EXISTS}
\end{itemize}