

Section 2: Solutions

1: SQL Practice

Problems

-- What is the total population of earth?

```
SELECT SUM (population) AS Total_Population
FROM Population;
```

-- What is the percentage of the population from the top 10 populated countries?

```
SELECT SUM (percentage)
FROM Population
WHERE rank <= 10;
```

-- How many countries do have less than 1,000,000 population?

```
SELECT COUNT(*) AS Small_Countries
FROM Population
WHERE population <= 1000000;
```

-- How many countries have airports?

```
SELECT COUNT (DISTINCT country) AS Airport_Count
FROM Airport;
```

-- Top 10 countries with most airports, in descending order

```
SELECT country, COUNT(*) AS Count
FROM Airport
GROUP BY country
ORDER BY COUNT(*) DESC
LIMIT 10;
```

-- Order the top 10 countries by total GDP per capita (gdp / population)

```
SELECT p.country, (g.gdp / p.population) AS GDP_per_capita
FROM Population p, GDP g
WHERE p.country = g.country
ORDER BY (g.gdp / p.population) DESC
LIMIT 10;
```

2: Join & Aggregation

/* Review of joins */

-- Who teaches CSE 451?

```
SELECT i.fname, i.lname
FROM Teaches AS t, Instructor AS i
WHERE t.username = i.username AND
      t.dept = 'CSE' AND t.number = 451;
```

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-- What courses does zahorjan teach?

```
SELECT c.dept, c.number
FROM Class c, Teaches t, Instructor i
WHERE c.dept = t.dept AND c.number = t.number
      AND t.username = i.username AND i.username = 'zahorjan';
```

-- Which courses do both levy and zahorjan teach?

```
SELECT c.dept, c.number, c.title
FROM Class c, Teaches t1, Teaches t2, Instructor i1, Instructor i2
WHERE c.dept = t1.dept AND c.dept = t2.dept AND
      c.number = t1.number AND c.number = t2.number AND
      t1.username = i1.username AND
      i1.username = 'levy' AND
      t2.username = i2.username AND
      i2.username = 'zahorjan';
```

-- We can use the same table multiple times in the same query.

-- In fact, in this query, we can't use Teaches or Instructor just once.

-- Why? Because with just one of both, we'd be asking for tuples

-- where the uid is levy and zahorjan in the same tuple.

/* Queries using aggregation functions */

-- How many classes are there in the course catalog?

```
SELECT COUNT(*)
FROM Class;
```

-- What are the highest and lowest class numbers?

```
SELECT MIN(number), MAX(number)
FROM Class;
```

/* Queries with both grouping and aggregation */

-- How many instructors teach each class?

```
SELECT dept, number, COUNT(DISTINCT username) AS teacher_count
FROM Teaches
GROUP BY dept, number;
```

-- Order the instructors by who teaches in the most departments

```
SELECT i.username, COUNT(DISTINCT t.dept) AS Department_Count
FROM Instructor i, Teaches t
WHERE i.username = t.username
GROUP BY i.username
ORDER BY COUNT(DISTINCT t.dept) DESC
```