- **Topic:** SQL SELECT Queries
- Assignments must be completed individually.
- No late assignments will be accepted.
- Only use SQL commands that are discussed in lectures to answer these questions.
- Follow the same format and style as the examples in the lectures.
- Proper indentation will make your code much easier to read and understand.
- Questions answered with SQL commands outside of lecture material will be ASSIGNED A GRADE OF ZERO.
- One of the main objectives of this course (and the only objective of this assignment) is to help students learn and master the fundamentals of SQL.
- Using "advanced" SQL commands to bypass the fundamentals defeats this purpose.
- Accordingly, DO NOT use
  - **VIEW** as intermediate steps, or
  - **INSERT**, **DELETE** or **UPDATE** as part of your query (you are to inquire on the data, NOT to modify it in any way).
- There should be only one query statement for each question. It may contain subqueries.
- All the queries must be formulated with respect to the Capital Ships database, whose schema is explained on the last page.
- A sample database is also provided (CapitalShips.db).
- Note that the database only contains a very small set of data.
- Feel free to add more data so that you can properly test your queries.
- Submit your completed solutions to **Crowdmark**.
- **Rubric:** Each question is worth 3 points, and will be graded according to the following rubric:
  - 3 points: Good (no mistake or only a very small mistake)
  - 2 points: OK (mostly correct)
  - 1 point: Poor (mostly wrong but has some merit)
  - 0 points: Wrong (totally off or no answer)

[3] 1. The 1921 treaty of Washington prohibited capital ships with displacements exceeding 35,000 tonnes. List the ships that violated the treaty and participated in at least one WWII battle. Exclude ships launched before 1921, when the treaty was signed. The result should display the ship names, their class names, displacements and country names.

[3] 2. Find the class(es) where no ship of that class was ever sunk. The result should list the class names, and their country names.

[3] 3. Find the pair of ships (A, B) that never fought in the same battle (regardless of fighting on the same side or against each other). Note that (A, B) and (B, A) is the same pair and only one should be included. The result should display the ship names.

[3] 4. Find the heaviest (in terms of displacement) battleship(s) that survived the war (that is, among all the ships that survived the war, find the heaviest bb). The result should display the ship names and their country names.

[3] 5. For countr(ies) having both battleships and battlecruisers, find the countries whose battleships(s) have never engaged in any battle. The result should display the country names.

[3] 6. Find the luckiest ship(s). That is, they were damaged in every battle in which they participated, but were never sunk. Exclude ships that never participated in any battle. The result should display the ship names and their class names.

[3] 7. Find the capital ship(s) that participated in all the battles that took place in 1942. The result should show ship names.

[3] 8. Find the country(s) that had ships which participated in every battle. For example, say a country had two ships and there were four battles in total. Ship #1 went to battles #1, #3 and #4, and Ship #2 went to battles #2 and #4. This country had ships that went to all four battles, and so this country should be listed in the result. The result should show country names.

[3] 9. Find the ship(s) that survived the most brutal battle. Brutality of a battle is measured by the total number of ships sunk, from all sides. The result should show ship names and their country names.

[3] 10. Which country suffered more naval losses, Gt. Britain or Japan? To find the answer, list the number of ships Gt. Britain and Japan lost (i.e. sunk) during the war. The result should be displayed in the following format.

Gt. Britain	Japan
26	31

The WWII Capital Ships Database

The Capital Ships database stores information about WWII capital ships. It involves the following relations:

Relations:

1. **Battle**
name	date
2. **Class**
className	type	country	numGun	bore	displacement
3. **Outcome**
shipName	battleName	result
   - **FOREIGN KEY**(”battleName”) REFERENCES ”Battle”(”name”),
   - **FOREIGN KEY**(”shipName”) REFERENCES ”Ship”(”name”).
4. **Ship**
name	class	launched
   - **FOREIGN KEY**(”class”) REFERENCES ”Class”(”className”).

Assumptions:

- A capital ship can either be a battleship or a battlecruiser.
- Ships are built in “classes” (think of it as the data type of the ship) from the same design, and the class is usually named after the first ship of that class.
- The relation Battle records
  - the name and
  - date of each battle.
- The relation Class records
  - className, the name of the class,
  - the type (bb for battleship and bc for battlecruiser),
  - the country that designed the class,
  - numGun, the number of main guns,
  - the bore (diameter of the gun barrel, in inches) of the main guns and
  - the displacement (weight, in tonnes).
- The relation Outcome gives the result (sunk, damaged, or ok) for each ship that participated in a battle.
- The relation Ship records
  - the name of the ship,
  - class, the name of its class, and
  - launched, the year in which the ship was launched.

Just in case you might need it, here is how to extract year from a date (replace %Y by %M for month and %D for day):

```
SELECT  strftime('%Y', date) AS Year
FROM    Battle;
```

Sample Data

- Here we provide sample data for the above four relations.
- Note that, these are just for your reference and make it easier to understand the semantics of the relations.
- Information in these tables is incomplete as complete data would make these tables too big.
- As such, there are some "dangling tuples" in this data, e.g., ships mentioned in Outcome that are not mentioned in Ship.
- Your query should assume the information is complete (i.e. no "dangling tuples" in the actual database).
- A sample CapitalShip database in SQL is also provided so that you can test your queries.

1. **Battle**

name	date
North Atlantic	1941-05-24
Guadalcanal	1942-11-15
North Cape	1943-12-26
Surigao Strait	1944-10-25

2. **Class**

className	type	country	numGun	bore	displacement
Bismarck	bb	Germany	8	15	42000
Iowa	bb	USA	9	16	46000
Kongo	bc	Japan	8	14	32000
North Carolina	bb	USA	9	16	37000
Renown	bc	Gt. Britain	6	15	32000
Revenge	bb	Gt. Britain	8	15	29000
Tennessee	bb	USA	12	14	32000
Yamato	bb	Japan	9	18	65000

3. **Outcome**

shipName	battleName	result
Bismarck	North Atlantic	sunk
California	Surigao Strait	ok
Duke of York	North Cape	ok
Fuso	Surigao Strait	sunk
Hood	North Atlantic	sunk
King George V	North Atlantic	ok
Kirishima	Guadalcanal	sunk
Prince of Wales	North Atlantic	damaged
Rodney	North Atlantic	ok
Scharnhorst	North Cape	sunk
South Dakota	Guadalcanal	damaged
Tennessee	Surigao Strait	ok
Washington	Guadalcanal	ok
West Virginia	Surigao Strait	ok
Yamashiro	Surigao Strait	sunk

4. **Ship**

name	**class**	**launched**
California	Tennessee	1921
Haruna	Kongo	1915
Hiei	Kongo	1914
Iowa	Iowa	1943
Kirishima	Kongo	1915
Kongo	Kongo	1913
Missouri	Iowa	1944
Musashi	Yamato	1942
New Jersey	Iowa	1943
North Carolina	North Carolina	1941
Ramillies	Revenge	1917
Renown	Renown	1916
Repulse	Renown	1916
Resolution	Revenge	1916
Revenge	Revenge	1916
Royal Oak	Revenge	1916
Royal Sovereign	Revenge	1916
Tennessee	Tennessee	1920
Washington	North Carolina	1941
Wisconsin	Iowa	1944
Yamato	Yamato	1941