THE UNIVERSITY OF BRITISH COLUMBIA
CPSC 304: MIDTERM EXAMINATION
MAY 30, 2014

Name: Sample Solution Student #: _____

Signature: _____

Notes about this examination

1. You have **65 minutes** (1 hour and 5 minutes) to write this examination.
2. Write your name, student #, and signature in ink (pen). You may use a pencil to write your solutions.
3. Answer all the questions on this paper.
4. The marks for each question are given in [].
5. Good luck!

Rules Governing Formal Examinations

1. Each examination candidate must be prepared to produce, upon the request of the invigilator or examiner, his or her UBCcard for identification.
2. Examination candidates are not permitted to ask questions of the examiners or invigilators, except in cases of supposed errors or ambiguities in examination questions, illegible or missing material, or the like.
3. No examination candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination. Should the examination run forty-five (45) minutes or less, no examination candidate shall be permitted to enter the examination room once the examination has begun.
4. Examination candidates must conduct themselves honestly and in accordance with established rules for a given examination, which will be articulated by the examiner or invigilator prior to the examination commencing. Should dishonest behaviour be observed by the examiner(s) or invigilator(s), pleas of accident or forgetfulness shall not be received.
5. Examination candidates suspected of any of the following, or any other similar practices, may be immediately dismissed from the examination by the examiner/invigilator, and may be subject to disciplinary action:
   i. speaking or communicating with other examination candidates, unless otherwise authorized;
   ii. purposely exposing written papers to the view of other examination candidates or imaging devices;
   iii. purposely viewing the written papers of other examination candidates;
   iv. using or having visible at the place of writing any books, papers or other memory aid devices other than those authorized by the examiner(s); and,
   v. using or operating electronic devices including but not limited to telephones, calculators, computers, or similar devices other than those authorized by the examiner(s)—(electronic devices other than those authorized by the examiner(s) must be completely powered down if present at the place of writing).
6. Examination candidates must not destroy or damage any examination material, must hand in all examination papers, and must not take any examination material from the examination room without permission of the examiner or invigilator.
7. Notwithstanding the above, for any mode of examination that does not fall into the traditional, paper-based method, examination candidates shall adhere to any special rules for conduct as established and articulated by the examiner.
8. Examination candidates must follow any additional examination rules or directions

Question	Mark	Max
Q1		15
Q2		20
Q3		15
Q4		10
Q5		20
Total		**80**

All of the questions on this midterm are related to the database schema and database instance which is on Appendix A. Please review it carefully and answer all of the following questions. For each query remove duplicates from your final answers where they are not explicitly requested, and include no extra columns).

1. Write the following SQL queries **without using subqueries.**

1A.[5 marks] Find the name of the ships heavier than 35,000 tons.

Query

```
Select shipName
From ShipModels, Ships
Where Ships.model = ShipModels.model
 AND displacement > 35000;
```

1B.[5 marks] Find those countries that have both battle ships and battle cruisers.(Assuming the intersect operator is **not** implemented). Show the result of your query using data from Appendix A.

Query

```
Select distinct(S1.country)
From ShipModels S1, ShipModels S2
Where S1.country = S2.country  AND
S1.type ='bc' AND S2.type= 'bb';
```

Result

```
country
________

Japan
Britain
```

Show the result of your query using data from Appendix A. 1C.[5 points] Find the name of all ships that begin with the letter "R". Show the result of your query using data from Appendix A.

Query

```
Select shipName
From Ships where shipName like "R%";
```

Result

```
shipName
_____________

Ramillies
Renown
Repulse
Resolution
Revenge
Royal Oak
Royal Sovereign
```

2 . Write the following SQL queries using **at least one subquery** (EXISTS, IN, ALL, ANY operators)**,** Show the result of your query using data from Appendix A.

2A.[7 marks] Find the countries whose ships had the largest number of guns.

Query	Result
Select country From ShipModels Where numGuns = (Select max(numGuns) From ShipModels); Select country From ShipModels Where numGuns >= All (Select numGuns From shipModels)	country _____ USA

2B.[7 marks] Find the models of ships, at least one of which was sunk in a battle

Query	Result
Select Model From Ships Where shipName in (Select shipName From Outcomes Where result = 'sunk')	model _____ Kongo Revenge North Carolina

2C.[6 marks] Find the battles in which ships of the "Revenge" model participated

Query	Result
Select battleName From Outcomes Where shipName in (Select shipName From Ships Where model = 'Revenge')	battleName _____ North Cape Surigao Strait

3. Write the following SQL queries. You can use any of the operators taught in the lectures. Show the result of your query using data from Appendix A.

3A.[7 marks] For each ShipModel with at least four ships, find the year in which the first ship of that model was launched.

Query	Result
Select model, min(launched) From Ships group by model Having count(*) > 3	Model min(launched) Iowa 1943 Kongo 1913 Revenge 1916

3B.[8 marks] For each ShipModel that has participated in a battle, find the number of ships of that model sunk in battles.

Query	Result
create view shipModelSunk as Select model, count(O.shipName) From Outcomes O, Ships S Where S.shipName=O.shipName AND O.result = 'sunk' Group by model Select * from shipModelSunk union Select model, 0 From Outcomes O, Ships S Where O.shipname = S.shipname and model not in (Select model From shipModelSunk) Group by model	Model count Kongo 1 North Carolina 1 Revenge 1 Tennessee 0

4. The following questions are related to creating and querying views.

4A[6 marks] Define a view BritishShips that gives for each ship of Great Britain its name, model, type, number of guns, bore, displacement, and year launched.

Query

```
Create view BritishShips(shipName, model, type,
numGuns, bore, displacement, launched) As
   Select  shipName, ShipModels.model, type,
   numGuns, bore, displacement, launched
   From shipModels, Ships
   Where ShipModels.model = Ships.model and country = 'Britain'
```

4B.[4 marks] Write a query using the BritishShips view asking for the number of guns and displacements of all British battleships launched before 1919.

Query

```
   Select  shipName, numGuns, displacement
   From BritishShips
   Where type = 'bc' and launched < 1919;
```

5. The following questions are related to modifying data of the relations provided on App

5A.[5 marks] Delete from table Ships all ships sunk in battles.

Query

```
Delete From Ships
Where shipName in
        (Select shipName
         From Outcomes
         Where result = 'sunk');
```

5B.[5 marks] Modify the shipModels relation so that gun bores are measured in centimeters instead of inches. Note that the attribute type of bore is double. (one inch = 2.5 centimeters)

Query

```
update shipModels set bore = bore  * 2.5;
```

5C.[5 marks] Insert a new tuple into the Battles table. Ship with name “Revenge” was in battle “Denmark Strait”, and it was damaged during the battle.

Query

```
Insert into Outcomes values
      (“Revenge”, “Denmark Strait”, “damaged”);
```

5D.[5 marks] Explain the difference between the statement DROP Outcomes and the statement DELETE FROM Outcomes.

“Drop Outcomes” will delete the Outcomes table and all of the tuples inside it, whereas “Delete from outcomes” may only delete a subset of tuples (depending on the where clause), and does not delete the Outcomes table.

6. Interesting challenging questions **(Not marked)**

6A Find those battles with at least two ships of the same country. Show the result of your query using data from Appendix A.

Query	Result

`Select distinct battleName`
`From Outcomes O, ShipModels M, Ships S`
`Where O.shipName = S.shipName`
`AND S.model = M.model`
`Group by battleName, Country`
`Having count(*) >= 2;`
	`battleName`
	`──────────`
	`Surigao Strait`

6.B. Find the average number of guns for ships that have participated in a battle.

Query	Result

`Create View New_outcomes As`
`  (Select distinct (shipName)`
`   from Outcomes);`
 	
`select avg(numGuns)`
`From New_outcomes O, Ships S, ShipModels M`
`Where O.shipName = S.shipName AND S.model = M.model`
	`9.8`

This space is intentionally left blank. You can use it to answer questions or as scratch paper
(if you use this, CLEARLY indicate the connection between this work and the problem it is for both here and where the problem is stated!)