CSE 3521 Database Management Systems
Assignment 2
Marks: 10 (5+5)

1. Consider the following Schema:

User (UserId, Name, Password)
Patent (PatentNo, PatentTitle, PatentContents, Diagrams, UserId (Foreign Key))
Bid (BidNo, UserId (Foreign Key), PatentNo (Foreign Key), StartBid, FinalSellingPrice)

Give an expression in the relational algebra to express each of the following queries:

i) Find all the bids that started at a price greater than 3000 and finally sold at less than 15,000.

ii) Find the patent no. and patent titles for all the users who sold their patents at a price greater than 2000.

Find the output for the following:

Π(PatentNo, PatentContents) (σ(StartBid > 3000 ^ PatentNo = (Π PatentNo(Patent))) Bid)

Write a sentence describing what the query will return.
Example: All patent holders whose names are John.

2. **a)** Consider the following Schema:

Artist (ArtistID, Name, Genre, Country, DebutYear)
Album (AlbumID, Title, ReleaseDate, ArtistID (Foreign Key), Genre)
Song (SongID, Title, Duration (in seconds), AlbumID (Foreign Key), ReleaseDate)
BillboardChart (ChartID, ChartDate, ChartName)
ChartEntry (EntryID, ChartID (Foreign Key), SongID (Foreign Key), Position, WeeksOnChart)

Now write SQL query for the following:

i) Retrieve all artists' names and their genres.

ii) Retrieve the list of songs along with their album titles.

iii) Retrieve the list of artists and their albums, including artists who don't have any albums.

iv) List the names of artists who have songs that have charted on the Billboard Hot 100 chart.

v) Using subquery, find the album with the highest total duration of songs.

b) Your team is working on a super exciting project for the Music Billboard [consider the schema of Q2(a)]. You've got this amazing script that's supposed to help analyze the songs and albums. But, oh no! When they try to run it, it's throwing errors left and right. It's time for you, the SQL wizard, to step in and save the day!

The team hands you this script:

```
WITH AvgArtistID AS (
   SELECT AVG(ArtistID) AS AvgID
   FROM Song
)
SELECT Title, Genre, AVG(Duration)
FROM Song, AvgArtistID
WHERE AVG(Duration) > Duration
GROUP BY Genre
HAVING Genre = 'Pop';
Select * from AvgArtistID;
```

You need to find out what went wrong and fix it.