CISC 7512X Final Exam

For the below questions, use the following schema definition.

```
book(isbn,title,subject)
person(pid,fname,lname,dob)
author(isbn,pid)
purchase(id,ts,isbn)
destroy(id,ts,isbn)
borrow(id,ts,isbn,pid)
return(id,ts,isbn,pid)
```

This is a schema for a library. The `book` table info on books. The `person` table has all the individuals, such as book borrowers and book authhrors. The `author` table links `person` authors to `book` records. The `purchase`, and `destroy` tables record when a library purchases or dstroys a copy of a particular book. The `borrow` and `return` tables record when someone borrows and subseuqently returns the book.

Note that the `book` table does not tell you if the book is available in the library—we need to ensure that the book has been purchased and not destroyed (we are recording events, not states)

Pick the best answer that fits the question. Not all of the answers may be correct. If none of the answers fit, write your own answer. There are at most 2 questions where writing your own answer may be appropriate.

1. (5 points) Find ISBN number of a book Catch 22.

    (a) `select title from book where upper(title)='CATCH 22';`
    (b) `select isbn from book where upper(title)='CATCH 22';`
    (c) `select isbn from author where upper(title)='CATCH 22';`
    (d) `select isbn from borrow where upper(title)='CATCH 22';`
    (e) Other:

2. (5 points) How many books have "CATCH" in their title?

    (a) `select group by count(*) from book where upper(title) like '%CATCH%';`
    (b) `select title,count(*) from book where upper(title) like '%CATCH%'`
       `group by title;`
    (c) `select count(*) from book where upper(title) like '%CATCH%';`
    (d) `select sum(1)/count(*) from book where upper(title) like '%CATCH%';`
    (e) Other:

3. (5 points) Find author of 'Catch 22'

    (a) `select fname,lname from book where upper(a.title)='CATCH 22'`
    (b) `select b.fname,b.lname from book a inner join author b`
       `where upper(a.title)='CATCH 22'`
    (c) `select c.fname,c.lname from book a inner join author b`
       `on a.pid = b.pid inner join person c on b.isbn=c.isbn`
       `where upper(a.title)='CATCH 22'`

(d) `select c.fname,c.lname from book a inner join author b`
    `on a.isbn = b.isbn inner join person c on b.pid=c.pid`
    `where upper(a.title)='CATCH 22'`

(e) Other:

4. (5 points) Find average age of individuals who have ever borrowed 'Catch 22'.

(a) `with blah as ( select c.pid,extract(years from age(c.dob)) age`
    `from book a`
    `inner join borrow b on a.isbn=b.isbn`
    `inner join person c on b.pid=c.pid`
    `where upper(a.title)='CATCH 22'`
    `group by c.pid,c.dob)`
    `select avg(age) from blah`

(b) `select extract(years from age(c.dob)) age`
    `from book a`
    `inner join borrow b on a.isbn=b.isbn`
    `inner join person c on b.pid=c.pid`
    `where upper(a.title)='CATCH 22'`

(c) `select avg(age) from person where title='CATCH 22'`

(d) `select avg(age)`
    `from (select c.pid,extract(years from age(c.dob)) age`
    `from book a`
    `inner join borrow b on a.isbn=b.isbn`
    `inner join person c on b.pid=c.pid`
    `where a.title='CATCH 22') a`

(e) Other:

5. (5 points) Create `bkauthor` table with same structure as person, but only has book authors.

(a) `create table bkauthors as select * from book a inner join author b`
    `on a.isbn = b.isbn inner join person c on b.pid=c.pid;`

(b) `create table bkauthors as select * author;`

(c) `create table bkauthor as select c.* from book a inner join author b`
    `on a.isbn = b.isbn inner join person c on b.pid=c.pid;`

(d) `create table bkauthor as select distinct c.* from book a`
    `inner join author b on a.isbn = b.isbn inner join person c on b.pid=c.pid;`

(e) Other:

6. (5 points) Find all books without an author.

(a) `select a.isbn from book a inner join author b`
    `on a.isbn = b.isbn where b.isbn is null;`

(b) `select a.isbn from book a left outer join author b`
    `on a.isbn = b.isbn where b.isbn is null;`

(c) `select a.isbn from book a left outer join author b`
    `on a.isbn = b.isbn where a.isbn is null;`

(d) ```
select a.isbn from book a left outer join author b
on a.isbn = b.isbn;
```

(e) Other:

7. (5 points) Find all books (isbn) with more than 2 authors.

(a) ```
select a.isbn from book a inner join author b
on a.isbn = b.isbn and count(*)>2;
```

(b) ```
select a.isbn from book a inner join author b
on a.isbn = b.isbn having count(*)>2;
```

(c) ```
select a.isbn from book a inner join author b
group by a.isbn having count(*)>2;
```

(d) ```
select a.isbn from book a inner join author b
on a.isbn = b.isbn group by a.isbn having count(*)>2;
```

(e) Other:

8. (5 points) Find all books written by Mark Twain.

(a) ```
select c.* from person a inner join author b
on a.pid=b.pid inner join book c on b.isbn=c.isbn
where a.fname='Mark' and lname='Twain';
```

(b) ```
select b.* from person a inner join author b
on a.pid=b.pid where a.fname='Mark' and lname='Twain';
```

(c) ```
select c.* from person a inner join author b
on a.pid=b.pid inner join book c on b.isbn=c.isbn
where a.fname='Samuel' and lname='Clemens' and
dob=cast('1835-11-30' as date);
```

(d) ```
select c.* from person a inner join book c
on b.isbn=c.isbn where a.fname='Mark' and lname='Twain';
```

(e) Other:

9. (5 points) What percentage of authors are named 'John'?

(a) ```
select
sum(case when fname='John' then 1.0 else 0.0 end)/sum(1.0)*100.0 prcnt
from bkauthor
```

(b) ```
select percentage() from authors where fname='John'
```

(c) ```
select
sum(when fname='John' then 1 end)/sum(when fname!='John' then 1 end)
from bkauthor
```

(d) ```
select percentage(sum(case when fname='John' then 1.0 else 0.0 end))
from bkauthor
```

(e) Other:

10. (5 points) Find all books (isbn) NOT written by anyone named "John".

(a) `select a.isbn from book a left outer join author b`
    `on a.isbn=b.isbn left outer join person c on b.pid=c.pid`
    `group by a.isbn having fname!='John' and lname!='John';`

(b) `select a.isbn from book a left outer join author b`
    `on a.isbn=b.isbn left outer join person c on b.pid=c.pid`
    `group by a.isbn`
    `having coalesce(max(case when c.fname='John' then 1 else 0 end),0)=0;`

(c) `select a.isbn from book a left outer join author b`
    `on a.isbn=b.isbn left outer join person c on b.pid=c.pid`
    `where fname!='John' and lname!='John';`

(d) `select a.* from book a left outer join author b`
    `on a.isbn=b.isbn left outer join person c on b.pid=c.pid`
    `having coalesce(max(case when c.fname='John' then 1 else 0 end),0)=0;`

(e) Other:

11. (5 points) What percentage of individuals (person) in our database are book authors?

(a) `select`
    `sum(case when author=true then 1.0 else 0.0 end)/sum(1.0)*100.0 prcnt`
    `from person a`

(b) `select`
    `sum(case when b.pid is null then 1.0 else 0.0 end)/sum(1.0)*100.0 prcnt`
    `from person a left outer join author b on a.pid=b.pid`

(c) `select`
    `(select count(*) from bkauthor) / (select count(*) from person)`

(d) `select`
    `sum(case when b.pid is not null then 1.0 else 0.0 end)/sum(1.0)*100.0 prcnt`
    `from person a left outer join author b on a.pid=b.pid`

(e) Other:

12. (5 points) Authors who have ever borrowed their own book.

(a) `select b.pid from book a inner join author b on a.isbn=b.isbn`

(b) `select b.pid from book a inner join borrow b`
    `on b.isbn=c.isbn and b.pid=a.pid`

(c) `select b.pid from book a inner join author b on a.isbn=b.isbn`
    `inner join borrow c`
    `on b.isbn=c.isbn and b.pid=c.pid`

(d) `select max(b.pid) from book a inner join borrow c`
    `on a.isbn=c.isbn and a.pid=c.pid`

(e) Other:

13. (5 points) How many books does the library have?

(a) `select`
    `(select count(*) from purchase) - (select count(*) from destroy)`

(b) `select count(*) from books`

(c) `select count(*) from purchase`

(d) `with blah as ( select 1 n from purchase union all -1 n from destroy )`
    `select sum(n)`

(e) Other:

14. (5 points) What's the most popular book (borrowed most often) in the library?

(a) `select title from book`
    `where max(borrowed) = count(*)`

(b) `select max(title)`
    `from borrow having count(*) = max(count(*))`

(c) `with allcnts as (select * from borrow),`
    `maxcnt as (select max(count(*)) mc from allcnts)`
    `select a.isbn from allcnts a inner join maxcnt b on a.cnt=b.mc;`

(d) `with allcnts as (`
    `select isbn,count(*) cnt from borrow group by isbn),`
    `maxcnt as (select max(cnt) mc from allcnts)`
    `select a.isbn from allcnts a inner join maxcnt b on a.cnt=b.mc;`

(e) Other:

15. (5 points) Who borrows the most books?

(a) `select count(*) from person`
    `where borrower = max(borrower);`

(b) `with allcnts as (`
    `select pid,count(*) cnt from borrow group by pid),`
    `maxcnt as (select max(cnt) mc from allcnts)`
    `select a.pid from allcnts a inner join maxcnt b on a.cnt=b.mc;`

(c) `select max(count(*)) from borrow group by pid;`

(d) `select pid`
    `from (select count(*) from borrow group by pid) a`
    `where cnt=max(count(*))`

(e) Other:

16. (5 points) Is is there a copy of 'CATCH 22' available to borrow right now?

(a) `select`
    `(select count(*) from borrow`
    `natural inner join book where upper(title)='CATCH 22') -`
    `(select count(*) from return`
    `natural inner join book where upper(title)='CATCH 22')`

(b) `select case when count(*) > 0 then 'AVAILABLE' else 'NOT AVAILABLE' end`
    `from book where upper(title)='CATCH 22'`

(c) `with evts as (`
    `select isbn,1 n from borrow union all`
    `select isbn,-1 from return)`
    `select case when sum(n) > 0 then 'AVAILABLE' else 'NOT AVAILABLE' end`

```
    from evts a inner join book b on a.isbn=b.isbn
    where upper(b.title)='CATCH 22'
```

(d)
```
with evts as (
select isbn,1 n from borrow union all
select isbn,-1 from return union all
select isbn,1 n from purchase union all
select isbn,-1 from destroy )
select case when sum(n) > 0 then 'AVAILABLE' else 'NOT AVAILABLE' end
from evts a
inner join book b on a.isbn=b.isbn where
upper(b.title)='CATCH 22'
```

(e) Other:

17. (5 points) Who has 'CATCH 22' borrowed right now?

(a)
```
with evnts as
(select a.*,-1 n from borrow a union all select a.*,1 n from return a)
select pid
from evnts a inner join book b using (isbn) where upper(title)='CATCH 22'
group by pid
having sum(n) < 0
```

(b)
```
select pid
from borrow a inner join book b using (isbn) where upper(title)='CATCH 22'
group by pid
having count(*) > 1
```

(c)
```
select distinct pid
from borrow a inner join book b using (isbn) where upper(title)='CATCH 22'
```

(d)
```
select (select count(*) from borrow) - (select count(*) from return)
from book a
where upper(title)='CATCH 22'
```

(e) Other:

18. (5 points) Find indivudals who borrowed 'The Catcher in the Rye' in the last two months.

(a)
```
select pid from borrow
where ts>=now()-interval '2 month' and
lower(title)='the catcher in the rye';
```

(b)
```
select a.pid from borrow a
inner join person b on a.pid=b.pid
where ts>=now()-interval '2 month' and
upper(b.title)='the catcher in the rye';
```

(c)
```
select a.fname, a.lname from borrow a
inner join book b on a.isbn=b.isbn
where ts>=now()-interval '2 month' and
lower(b.title)='the catcher in the rye';
```

(d)
```
select a.pid from borrow a inner join book b on a.isbn=b.isbn
where ts >= now()-interval '2 month' and
lower(b.title)='the catcher in the rye';
```

(e) Other:

19. (5 points) What is the top 1% most popular books (borrowed most often)?

(a) with allcnts as (select isbn,count(*) cnt from borrow group by isbn),
    pr as (select a.*, row_number() over (order by cnt)/sum(1.0) over () pr
    from allcnts a)
    select isbn from pr a where pr >= 0.99

(b) with allcnts as (
    select b.subject,count(*) cnt from borrow a inner join book b
    on a.isbn=b.isbn group by b.subject),
    maxcnt as (select max(cnt) mc from allcnts)
    select a.subject from allcnts a inner join maxcnt b on a.cnt=b.mc

(c) select isbn from borrow where percentile(borrowed)>99

(d) select isbn from book natural inner join borrow
    group by isbn having percentile(iid)>0.95

(e) Other:

20. (5 points) When were the most books borrowed at any given time? Give time and number of borrowed books.

(a) with cnts as (
    select ts, sum(1.0) over (order by ts) cnt from borrow a),
    maxcnt as (select max(cnt) mc from cnts)
    select a.ts,a.cnt from cnts a inner join maxcnt b on a.cnt=b.mc;

(b) with evts as (select a.*,1 n from borrow a union all
    select a.*,-1 from return a),
    cnts as (select ts,
    sum(n) over (rows between unbounded preceding and current row) cnt
    from evts),
    maxcnt as (select max(cnt) cnt from cnts)
    select *
    from cnts a natural inner join maxcnt;

(c) with evts as (select ts,1 n from borrow union all
    select ts,-1 from return),
    runtot as (select a.*, sum(n) over (order by ts) rtot from evts a),
    mxtot as (select max(rtot) m from runtot)
    select ts,rtot
    from runtot a
    inner join mxtot b on a.rtot=b.m

(d) with cnts as (
    select ts, sum((select 1 from borrow)+(select -1 from return)) over () cnt),
    maxcnt as (select max(cnt) mc from cnts)
    select a.ts from cnts a inner join maxcnt b on a.cnt=b.mc;

(e) Other: