1. Find all books.
   Answer: publication id, title, publisher, and year.
   Query:

   ```
   select distinct book.pubid, title, publisher, year
   from book, publication
   where book.pubid = publication.pubid
   ```

2. Find all articles that have appeared in proceedings entitled “LNCS 1234”.
   Answer: publication id, title, and page numbers.
   Query:

   ```
   select distinct p1.pubid, p1.title, startpage, endpage
   from article, proceedings, publication p1, publication p2
   where article.pubid = p1.pubid
     and article.crossref = proceedings.pubid
     and proceedings.pubid = p2.pubid
     and p2.title = "LNCS 1234"
   ```

3. Is there any publication that is simultaneously a book and an article?
   Answer: publication id and title.
   Query:

   ```
   select distinct publication.pubid, title
   from book, publication, article
   where book.pubid = article.pubid
     and article.pubid = publication.pubid
   ```

4. Find all articles that have appeared in two (or more) proceedings.
   Answer: publication id of the article, publication id of proceedings #1, and publication id of proceedings #2.
   Query:

   ```
   ```
select distinct a1.pubid, p1.pubid, p2.pubid
from article a1, article a2, proceedings p1, proceedings p2
where a1.crossref = p1.pubid
    and a2.crossref = p2.pubid
    and p2.pubid != p2.pubid
    and a1.pubid = a2.pubid

5. Find all articles and the year in which they appeared.
   Answer: pubid, title, and year.
   Query:

   select distinct article.pubid, title, year
   from article, publication,
       ((select pubid, year from book)
        union
        (select pubid, year from journal)
        union
        (select pubid, year from proceedings)) as pubyear
   where crossref = pubyear.pubid
       and article.pubid = publication.pubid

6. Find all authors who have written a book or are editors of a journal.
   Answer: author id and title of the book or name of the journal (there
   may be multiple answers for a single author listing all her books/journals).
   Query:

   select distinct author, title
   from ((select author, pubid
            from wrote, book
            where wrote.publication = book.pubid)
        union
        (select author, pubid
            from ((select author, pubid
                    from wrote, book
                    where wrote.publication = book.pubid)
               union
               (select author, pubid
from wrote, journal
where wrote.publication = journal.pubid)) as bj,
publication
where bj.pubid = publication.pubid

7. Find all articles that haven’t appeared in a book.
   Answer: publication id and title.
   Query:
   
   select distinct article.pubid, title
   from article, publication
   where article.pubid not in ( select article.pubid
      from article, book
      where article.crossref = book.pubid
   and article.pubid = publication.pubid

8. Is every publication a book, journal, proceedings, or an article? Answer: yes/no
   Query:
   
   select distinct "No" as answer
   from publication
   where pubid not in ( select pubid from book
      union
      (select pubid from journal)
      union
      (select pubid from proceedings)
      union
      (select pubid from article))

(technically, one needs one more query that answers Yes in the other case.)
9. Find all authors who are editors of a journal and have an article appearing in that journal.

Answer: author id, title of the article, and name of the journal (again, there may be multiple answers)

Query:

```
select w1.author, p1.title, p2.title
from article a, journal j, wrote w1, wrote w2,
     publication p1, publication p2
where w1.author = w2.author
    and w1.publication = a.pubid and w2.publication = j.pubid
    and w1.publication = p1.pubid and w2.publication = p2.pubid
    and a.crossref = j.pubid
```

10. Find all books that do not contain any articles.

Answer: publication id and title.

Query:

```
select book.pubid, title
from book, publication
where book.pubid not in
  (select crossref from article)
  and book.pubid = publication.pubid
```

11. Find all journals that do not contain an article with more that 50 pages

Answer: journal name, volume, number, and year.

Query:

```
select title, volume, no, year
from journal, publication
where journal.pubid not in
  (select distinct crossref
   from article
   where pagecount > 50)
```
from article
where startpage-endpage > 50)
and journal.pubid = publication.pubid

12. Find all articles that have appeared in conference proceedings and later in a journal.

Answer: article title, proceedings title, journal name

Note: you can compare years using “<”, i.e., $x < y$ is true when the value assigned to $x$ is smaller than the one assigned to $y$.

Query:

select publication.title, pa.title, ja.title
from (select article.pubid, year, title
from article, proceedings, publication
where crossref = proceedings.pubid
    and publication.pubid = proceedings.pubid) as pa,
(select article.pubid, year, title
from article, journal, publication
where crossref = journal.pubid
    and publication.pubid = journal.pubid) as ja,
publishation
where pa.pubid = ja.pubid
    and pa.year < ja.year
    and publication.pubid = pa.pubid
13. Find all authors whose publications are solely articles.
   Answer: author id and name.
   Query:
   
   ```
   select distinct aid, name 
   from author 
   where aid not in 
     ( select author 
       from wrote 
       where publication not in 
         ( select pubid 
           from article ) )
   ```

14. Find proceedings that contain exactly one article.
   Answer: proceedings’ publication id and title.
   Query:
   
   ```
   select proceedings.pubid, title 
   from publication, proceedings, article 
   where proceedings.pubid = article.crossref 
     and proceedings.pubid = publication.pubid 
   and not exists ( select * 
     from article a1, article a2 
     where a1.crossref = a2.crossref 
       and a1.crossref = proceedings.pubid 
       and a1.pubid != a2.pubid)
   ```
15. Find all pairs of authors who always publish together.  
Answer: author ids and names of both authors.  
Query:

```sql
select a1.aid, a1.name, a2.aid, a2.name  
from author a1, author a2  
where not exists (  
    select *  
    from publication p, wrote w1  
    where p.pubid = w1.publication  
        and a1.aid = w1.author  
        and a2.aid not in (  
            select author  
            from wrote  
            where publication = p.pubid  
                and author <> a1.aid)  
    and not exists(  
        select *  
        from publication p, wrote w2  
        where p.pubid = w2.publication  
            and a2.aid = w2.author  
            and a1.aid not in (  
                select author  
                from wrote  
                where publication = p.pubid  
                    and author <> a2.aid))
```
16. How many authors have written a book?
   Answer: Number of authors (name of output attribute A#)
   Query:
   
   ```sql
   select count(distinct author) as A#
   from book, wrote
   where pubid = publication
   ```

   or, more verbose:

   ```sql
   select count(aid) as 'A#'
   from ( select distinct aid
          from book, wrote
          where pubid = publication ) ab
   ```

   NOTE: there is no group by clause as the list of grouping attributes is empty (i.e., there is only one group).

17. How many articles are there with at least 4 authors?
   Answer: Number of articles (name of output attribute A#)
   Query:

   ```sql
   select count(pub) as A#
   from (select distinct publication as pub
          from wrote, article
          where publication = pubid
          group by publication
          having count(author) >= 4) p4
   ```
18. For all proceedings find the number of articles that have appeared in the proceedings.

   Answer: Proceedings id and title, and the number of articles (name of output attributes pubid, title, and A#)

   Query:

   ```
   select pubid, title, cnt as A#
   from proceedings, publication,
       ( select crossref as crossref, count(pubid) as cnt
           from article
           group by crossref ) nos
   where proceedings.pubid = publication.pubid
       and proceedings.pubid = nos.crossref
   ```
19. For all authors list the number of conference papers, the number of journal articles, the number of other articles, and the total of all articles.

Answer: author id, author name, #conference, #journal, #other, and #total of papers (name the output attributes ”ID”, ”NAME”, ”C#”, ”J#”, ”O#”, and ”T#”, respectively).

Query:

```sql
select aid as ID, name, cs as 'C#', js as 'J#',
       os as 'O#', cs+js+os as 'T#'
from   author a,
       ( select author as aid, count(publication) as cs
           from   wrote
           where  publication in
               ( select pubid
                 from   article
                 where  crossref in
                     ( select pubid
                       from   proceedings ) ) ) confs
       ( select author as aid, count(publication) as js
           from   wrote
           where  publication in
               ( select pubid
                 from   article
                 where  crossref in
                     ( select pubid
                       from   journal ) ) ) journals
       ( select author as aid, count(publication) as js
           from   wrote
           where  publication in
               ( select pubid
                 from   article
                 where  crossref not in
                     ( select pubid from proceedings ) ) )
```
and crossref not in
   ( select pubid from journal )
)
) others
where a.aid = confs.aid and a.aid = journals.aid
and a.aid = others.aid

20. For every author list how many times he/she published with exactly
k coauthors (for all k for which there is at least one publication with
this many coauthors).

Answer: Author id and name, number of coauthors ("C#"), number
of publications ("P#")

Query:

   select a.aid, a.name, noc.c-1 as 'C#', count(noc.p) as '#P'
   from author a
   ( select w1.author as a, w1.publication as p,
     count(w2.author) as c
     from wrote w1, wrote w2
     where w1.publication = w2.publication
     group by w1.author, w1.publication ) noc
   where a.aid = noc.a
   group by a.aid, a.name, noc.c