1. Find all books.
   Answer: publication id, title, publisher, and year.
   Query:
   \[
   \{(i, t, p, y) \mid \text{book}(i, p, y) \land \text{publication}(i, t)\}
   \]

2. Find all articles that have appeared in proceedings entitled “LNCS 1234”.
   Answer: publication id, title, and page numbers.
   Query:
   \[
   \{(i, t, s, e) \mid \exists c, y.\text{publication}(c, ”LNCS 1234”) \land \text{proceedings}(c, y) \land \text{article}(i, c, s, e) \land \text{publication}(i, t)\}
   \]

3. Is there any publication that is simultaneously a book and an article?
   Answer: publication id and title.
   Query:
   \[
   \{(i, t) \mid \exists p, y, c, s, e.\text{publication}(i, t) \land \text{book}(i, p, y) \land \text{article}(i, c, s, e)\}
   \]

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:
   \[
   \{(i, c_1, c_2) \mid \exists s_1, e_1, s_2, e_2, y_1, y_2.\text{article}(i, c_1, s_1, e_1) \land \text{article}(i, c_2, s_2, e_2) \land \text{proceedings}(c_1, y_1) \land \text{proceedings}(c_2, y_2) \land \neg (c_1 = c_2)\}
   \]

5. Find all articles and the year in which they appeared.
   Answer: pubid, title, and year.
   Query:
   \[
   \{(i, t, y) \mid (\exists c, s, e, p, t_1.\text{article}(i, c, s, e) \land \text{publication}(i, t) \land \text{book}(c, p, y) \land \text{publication}(c, t_1)) \lor (\exists c, s, e, v, n, t_2.\text{article}(i, c, s, e) \land \text{publication}(i, t) \land \text{journal}(c, v, n, y) \land \text{publication}(c, t_2)) \lor (\exists c, s, e, t_3.\text{article}(i, c, s, e) \land \text{publication}(i, t) \land \text{proceedings}(c, y) \land \text{publication}(c, t_3))\}
   \]
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:
   \[
   \{(a, t) \mid (\exists na, u, i, p, y).author(a, na, u) \land wrote(a, i) \land publication(i, t) \land book(i, p, y)) \lor (\exists na, u, i, v, n, y.author(a, na, u) \land wrote(a, i) \land publication(i, t) \land journal(i, v, n, y))\}\]

7. Find all articles that haven’t appeared in a book.
   Answer: publication id and title.
   Query:
   \[
   \{(i, t) \mid \exists c, s, e.article(i, c, s, e) \land publication(i, t) \land \neg \exists p, y.book(c, p, y)\}\]

8. Is every publication a book, journal, proceedings, or an article? Answer: yes/no
   Query:
   \[
   \forall i, t.\ publication(i, t) \rightarrow \exists p, y_1.\ book(i, p, y) \lor \exists v, n, y_2.\ journal(i, v, n, y_2) \lor \exists y_3.\ proceedings(i, y_3) \lor \exists c, s, e.article(i, c, s, e)\]

9. Find all authors who are editors of a journal and have an article appearing in that journal.
   Answer: author id and title of the article and name of the journal
   (again, there may be multiple answers)
   Query:
   \[
   \{(a, t_a, t_j) \mid \exists na, u, a_i, j_i, v, n, y, t_j, s, e.journal(j_i, v, n, y) \land publication(j_i, t_j) \land author(a, na, u) \land wrote(a, j_i) \land article(a_i, j_i, s, e) \land publication(a_i, t_a) \land wrote(a, a_i)\}\}

10. Find all books that do not contain any articles.
    Answer: publication id and title.
    Query:
    \[
    \{(i, t) \mid \exists y.\ publication(i, t) \land book(i, p, y) \land \forall i', j, s, e.article(i', j, s, e) \rightarrow i \neq j\}\}
11. Find all journals that do not contain an article with more than 50 pages

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

Query:
\{(t, v, n, y) \mid \exists i. \text{journal}(i, v, n, y) \land \text{publication}(i, t) \land \neg \exists i', s, e. \text{article}(i', i, s, e) \land (e - s) > 50\}\n
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:
\{(t_a, t_p, t_j) \mid \exists i_a, i_j, i_p, y_j, y_p, v, n, s, e. \text{journal}(i_j, v, n, y_j) \land \text{proceedings}(i_p, y_p) \land (y_j > y_p) \land \text{article}(i_a, i_j, s, e) \land \text{article}(i_a, i_p, s, e) \land \text{publication}(i_a, t_a) \land \text{publication}(i_p, t_p) \land \text{publication}(i_j, t_j)\}\n
13. Find all authors whose publications are solely articles.

Answer: author id and name.

Query:
\{(a, n) \mid \exists u. \text{author}(a, n, u) \land (\forall i. \text{wrote}(a, i) \rightarrow \exists j, s, e. \text{article}(i, j, s, e))\}\n
14. Find proceedings that contain exactly one article.

Answer: proceedings’ publication id and title.

Query:
\{(i, t) \mid \text{publication}(i, t) \land \exists y. \text{proceedings}(i, y) \land (\forall j, j', s, s', e, e'. \text{article}(j, i, s, e) \land \text{article}(j', i, s', e') \rightarrow j = j')\}\n
15. Find all pairs of authors who always publish together.

Answer: author ids and names of both authors.

Query:
\{(a_1, n_1, a_2, n_2) \mid \exists u_1, u_2. \text{author}(a_1, n_1, u_1) \land \text{author}(a_2, n_2, u_2) \land (\forall p, t. \text{publication}(p, t) \rightarrow (\text{wrote}(a_1, p) \leftrightarrow \text{wrote}(a_2, p)))\}\