Question 1

a.

$$\begin{aligned}
\texttt{RedBooks} &\leftarrow \sigma_{\texttt{(color = "red")}}(\texttt{Book}) \\
\texttt{A} &\leftarrow \texttt{RedBooks} \bowtie_{\texttt{(RedBooks.ISBN = Distribute.ISBN)}} \texttt{Distribute} \\
\texttt{Calgary} &\leftarrow \sigma_{\texttt{(sname = "Calgary")}}(\texttt{A}) \\
\texttt{Result} &\leftarrow \pi_{\texttt{(name, city)}}(\texttt{A - Calgary})
\end{aligned}$$

b.

$$\begin{aligned}
\texttt{Schools} &\leftarrow \sigma_{\texttt{(city = "Paris")}}(\texttt{School}) \\
\texttt{A} &\leftarrow \texttt{Schools} \bowtie_{\texttt{(sname = name)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{((pname = name) and (Publisher.city = "London"))}} \texttt{Publisher} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(director)}}(\texttt{B})
\end{aligned}$$

c.

$$\begin{aligned}
\texttt{RomePublishers} &\leftarrow \sigma_{\texttt{(city = "Rome")}}(\texttt{Publisher}) \\
\texttt{A} &\leftarrow \texttt{RomePublishers} \bowtie_{\texttt{((pname = name) and (sname = "Toronto"))}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(sname = name)}} \texttt{School} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(School.name)}}(\texttt{B})
\end{aligned}$$

d.

$$\begin{aligned}
\texttt{CalgarySchools} &\leftarrow \sigma_{\texttt{(city = "Calgary")}}(\texttt{School}) \\
\texttt{A} &\leftarrow \texttt{CalgarySchools} \bowtie_{\texttt{(sname = name)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(A.ISBN = Book.ISBN)}} \texttt{Book} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(title, count)}}(\texttt{title} f_{\texttt{(COUNT *)}}(\texttt{Titles}))
\end{aligned}$$

e.

$$\begin{aligned}
\texttt{A} &\leftarrow \texttt{Publisher} \bowtie_{\texttt{(name = pname)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(A.city = School.city)}} \texttt{School} \\
\texttt{C} &\leftarrow \texttt{Book} \bowtie_{\texttt{(Book.ISBN = B.ISBN)}} \texttt{B} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(title, count)}}(\texttt{title} f_{\texttt{(COUNT *)}}(\texttt{C}))
\end{aligned}$$

Question 2

a.

$$\{\texttt{s.stno} \mid \texttt{Street(s) and } \exists \texttt{c}(\texttt{Country(c) and c.name = "Canada" and } \forall (ct)(\texttt{City(ct) and ct.country-name = c.country}))\}$$

b.

todo

c.

todo

d.

todo

e.

todo