1. The relation \textit{SequelOf}(movie, sequel) gives the immediate sequels of movies. Use the SQL “\textit{with recursive}” clause to write a query to find all sequels of all movies. That is, compute all pairs \((\text{movie, sequel})\) where the \textit{sequel} is not just the direct sequel, but also the sequel of the sequel, the sequel of the sequel of the sequel, and so on.

2. Consider the following database schema.

\textit{supplier}(\textit{SName, SAddress}) key: \textit{Sname}
\textit{item}(\textit{ItemNumber, ItemName, Color, Weight}) key: \textit{ItemNumber}
\textit{shipment}(\textit{SName, ItemNumber, Quantity, ShipDate}) key: \{\textit{Sname, ItemNumber}\}

Using this schema, write relational-calculus expressions for the following queries. For (c) and (d), convert your relational-calculus statement to SQL by first converting all universal quantifiers (if any) to existential quantifiers and then converting the statement directly into SQL.

(a) Find the supplier name and item number for shipments that have a quantity less than 200 or a weight greater than 20.

(b) List pairs of item numbers of items that have the same color. Do not list an item number with itself, and do not list a pair of item numbers in both orders.

(c) List names and addresses of suppliers who are currently shipping all items.

(d) List names and addresses of suppliers who are currently shipping all green items that weigh less than 50.

3. Using the database schema in Problem (2), write the following skyline queries in SQL. Skyline queries list the entries not “dominated” by other entries with respect to the criteria of interest. One entry “dominates” another if it is the same or better for all criteria of interest and better for at least one of the criteria of interest. (Assume that \textit{ShipDate} is of type \textit{Date}, which has the standard less-than, ..., greater-than operators \(<, ..., >\) that return expected Boolean results. For example, \((12 \text{ May 2012}) < (1 \text{ June 2012})\) returns \textit{true}.)

(a) Find skyline shipments with the highest quantities and the earliest shipment dates. Include in the result: \textit{SName, ItemNumber, Quantity, and ShipDate} ordered first by \textit{ShipDate} in ascending order and then by \textit{Quantity} in descending order.

(b) Find skyline shipments with the greatest total weights \((\text{Total Weight} = \text{Quantity} \times \text{Weight})\) and the earliest shipment dates. Include in the result the supplier name, the item number, the total weight for the shipment, and the shipping date. Order these entries in the table first by shipping date in ascending order and then by total weight in descending order.