6.3.9 Exercises for Section 6.3

Exercise 6.3.1: Write the following queries, based on the database schema

```
Product(maker, model, type)
PC(model, speed, ram, hd, price)
Laptop(model, speed, ram, hd, screen, price)
Printer(model, color, type, price)
```

of Exercise 2.4.1. You should use at least one subquery in each of your answers and write each query in two significantly different ways (e.g., using different sets of the operators `EXISTS`, `IN`, `ALL`, and `ANY`).

a) Find the makers of PC's with a speed of at least 3.0.

b) Find the printers with the highest price.

! c) Find the laptops whose speed is slower than that of any PC.

! d) Find the model number of the item (PC, laptop, or printer) with the highest price.

! e) Find the maker of the color printer with the lowest price.

!! f) Find the maker(s) of the PC(s) with the fastest processor among all those PC's that have the smallest amount of RAM.

Exercise 6.3.2: Write the following queries, based on the database schema

```
Classes(class, type, country, numGuns, bore, displacement)
Ships(name, class, launched)
Battles(name, date)
Outcomes(ship, battle, result)
```

of Exercise 2.4.3. You should use at least one subquery in each of your answers and write each query in two significantly different ways (e.g., using different sets of the operators `EXISTS`, `IN`, `ALL`, and `ANY`).

a) Find the countries whose ships had the largest number of guns.

! b) Find the classes of ships, at least one of which was sunk in a battle.

c) Find the names of the ships with a 16-inch bore.

d) Find the battles in which ships of the Kongo class participated.

!! e) Find the names of the ships whose number of guns was the largest for those ships of the same bore.

5.2.8 Exercises for Section 5.2

Exercise 5.2.1: Here are two relations:

$R(A,B)$: $\{(0,1),\ (2,3),\ (0,1),\ (2,4),\ (3,4)\}$

$S(B,C)$: $\{(0,1),\ (2,4),\ (2,5),\ (3,4),\ (0,2),\ (3,4)\}$

Compute the following: a) $\pi_{A+B,A^2,B^2}(R)$; b) $\pi_{B+1,C-1}(S)$; c) $\tau_{B,A}(R)$; d) $\tau_{B,C}(S)$; e) $\delta(R)$; f) $\delta(S)$; g) $\gamma_{A,\ \mathrm{SUM}(B)}(R)$; h) $\gamma_{B,\mathrm{AVG}(C)}(S)$; ! i) $\gamma_A(R)$; ! j) $\gamma_{A,\mathrm{MAX}(C)}(R \bowtie S)$; k) $R \overset{\circ}{\bowtie}_L S$; l) $R \overset{\circ}{\bowtie}_R S$; m) $R \overset{\circ}{\bowtie} S$; n) $R \overset{\circ}{\bowtie}_{R.B<S.B} S$.