Part I Algorithm complexity (Due today)

1) Compute the running time of these algorithms in terms of the number of operations and big-O. Briefly describe what these algorithms are doing.

a)
\begin{verbatim}
i=0;
output=1;
while(i<n)
    output = output*input;
i++;
\end{verbatim}

b)
\begin{verbatim}
for(int i=0;i<n;i++)
    j=1;
    while(j<i)
        System.out.println(j);
        j=j*2;
\end{verbatim}

c)
\begin{verbatim}
int b[] = {0,0,0,…};
for(int i=0;i<n;i++)
    for(int j=0;j<n;j++)
        if(a[j] == a[i])
            b[i]++;
\end{verbatim}

2) Prove or disprove the following statements

a) \( n^2 = O(n^3) \)
b) \( 3n(\log(n)+n)=O(n^3) \)
c) \( 7n^2+5n-1000=\Theta(n^2) \)
d) \( n^3=\Omega(n^3) \)
e) \( n^3=O(n^3) \)
Part II Database design (Due Thursday, preferably today)

An online user-car trading dot-com hires you to design a database for its web site. The database will store information about used automobiles for sale.

- Each automobile has a VIN (vehicle identification number), a model (e.g. Camry), a make (e.g. Chevrolet), a year (e.g. 2002), a color (e.g. red), a mileage (e.g. 50,000), and a body style (coupe).
- Each automobile has a seller, for which the seller name, address, telephone, and email is stored.
- In addition, the web site maintains reviews about automobiles. Each review is about one particular model, make and year (Note: it is not about an individual car but about a particular year’s model). Each review has an author. The same author may write several reviews, and each make, model year may have several reviews from several authors.

a) Design an ER diagram for this database. Very briefly explain the intuitive meaning of the entities and relationships. Do not forget to indicate keys and relationship types.

b) Design a relational schema from the ER diagram. In other words, write the specification of the tables (specify the attributes and their types of the tables and indicate how they are connected, i.e. primary and foreign keys).
Part III: Create the previously designed database (from Part II) in Microsoft Access (Due Sunday this week, preferably Thursday)

Microsoft access is one of the easiest to learn/use database management systems. Mostly, it is used for lightweight databases, like small business or family accounting/invoices.

Here are a few very easy to follow tutorials

http://www.techtrainteam.com/services/olt/office2000/access-a1.html#define1


http://databases.about.com/od/tutorials/ss/

Here are your tasks for this assignment:

a) Create the tables
b) Design a query that outputs information of the car and seller of all cars manufactured after 2002
c) Design a report that prints the query

Part IV (extra credit) Connect your database with a java application.

Write a program that prints out all the entries in a database

You can use the following tutorials:


http://www.softlookup.com/tutorial/access/index.asp

http://www.easysoft.com/applications/microsoft-access/jdbc-odbc.html