G51DBS 2008/9 first assessed coursework (cw1)

Weighting: 5 % of the course mark.
Deadline: 13 February at 16:00, submit to the School office.
This coursework is based on last year's exam questions.

1. Question on relational algebra: you will need to revise material covered in lectures 2 and 3.

   (a) Given the relations `Student`, `Marks` and `Module` below:

Student	
ID	Name
111	Tom
222	John
333	Sue
444	Anne

Marks		
ID	Code	Mark
111	G51PRG	60
111	G51FUN	65
111	G51DBS	70
222	G51PRG	70
222	G51DBS	80
333	G51IRB	50
333	G51PRG	50

Module	
Code	Title
G51PRG	Java
G51FUN	Haskell
G51DBS	Databases
G51IRB	Robotics

   give the results of the following relational algebra expressions:

   (i) $\pi_{\texttt{Title}}(\texttt{Module})$
   (ii) $\sigma_{\texttt{Code=G51PRG}}(\texttt{Marks})$
   (iii) $\pi_{\texttt{ID}}\sigma_{\texttt{Code=G51PRG}}(\texttt{Marks})$
   (iv) $\pi_{\texttt{ID}}(\texttt{Student}) - \pi_{\texttt{ID}}\sigma_{\texttt{Code=G51PRG}}(\texttt{Marks})$
   (v) $\pi_{\texttt{ID}}\sigma_{\texttt{Code=G51PRG}}(\texttt{Marks}) \cap \pi_{\texttt{ID}}\sigma_{\texttt{Code=G51FUN}}(\texttt{Marks})$
   (vi) $\sigma_{\texttt{Name=John}}(\texttt{Student}) \times \sigma_{\texttt{Code=G51DBS}}(\texttt{Marks})$

   (b) Assume that there are more values in the tables than shown. In particular, in the `Student` table there might be a student with the name 'James' and in the `Module` table there might be a module with the title 'Computer Graphics'. Write a relational algebra expression which computes James's mark for Computer Graphics.

2. Question on E/R modelling. You will need to revise material in lecture 4.

   You are asked to design a database for an on-line store. The database should contain the following data. First of all, there is data about products that the store sells. Each product has a catalogue number, description, price and amount in stock. There is also customer data: each customer has a name, email address, and postal address (you can also choose to create customer numbers for them). Finally, there are orders which the customers make to buy products. Each order will involve one customer and one or more products. Orders have unique numbers, and they also have status (processing, despatched, delivered).

   Draw an entity-relationship diagram for the store database.