CS_125 Logic Programming
Coursework Assignment 2

Due date: Friday, 23 April 2004
Solutions are to be submitted in pairs.

Question 1. (a) Define a predicate factorial/2 that computes the factorial \( n! \) (= \( 1 \times 2 \times \ldots \times n \)) of a natural number \( n \).

(b) Define predicate factorialList/2 that for a given natural number \( n \) computes the list \([1!, 2!, \ldots, n!]\). [20 marks]

Question 2. (T. van Lee, exercise 3.14) A robot is used in a supermarket to bag customer’s goods. At the checkout counter, after the items are checked for payment, a list of items is passed to the robot’s memory to be used in the bagging task. Write a Prolog program bagger/2 to receive the above-mentioned list of items and instruct the robot to put the items in bags according to the following rules:

- Large items must be placed in bags first, then the medium-size items, and finally the small items.
- Items have size 1,3, or 5, and all bags are of the same size 19.
- An item must be put into one of the current bags if there is room for it.
- If no current bags have enough room for the item at hand, then a new bag is used.

The program should contain a database on sizes of various items in the shop and produce a list of bags, each of which consists of a list of items in the order from top to bottom of the bag. For example, if the list of items is [coke, cake, mug, mug, choc, butter, coke, bread, tissuebox, soap, biscuit, lettuce, coke], then the output could be:

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bag 1: soap	bag 2: biscuit	bag 3: bread
  butter	cake	coke
  choc	coke
  mug	tissuebox
  mug
  lettuce
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[60 marks]

Question 3. Use Prolog to solve the following puzzle:

Professor to assistant: There are three persons in the waiting room; the product of their ages is 2450 and the sum is twice your age.

Assistant: I still don’t know their ages.

How old is the assistant? [20 marks]