**CS 310**
Homework Assignment No. 6
Due on Tue 3/4/2003

1. Find the optimal Huffman code for the following table of symbols:

character	frequency
a	5
b	10
c	13
d	14
e	25
f	33

In order to avoid multiple solutions (and make things easier for the grader), after constructing the binary tree associated to the optimal Huffman code assign always "1" to the branch that goes from a vertex to a children with lower frequency and "0" to the branch connecting to the children with higher frequency.

2. Use (1) the Breadth-First Search Algorithm and (2) the Depth-First Search Algorithm to find two spanning trees of the following graph **with its edges ordered in reverse alphabetic order**: $i, h, g, f, e, d, c, b, a.$
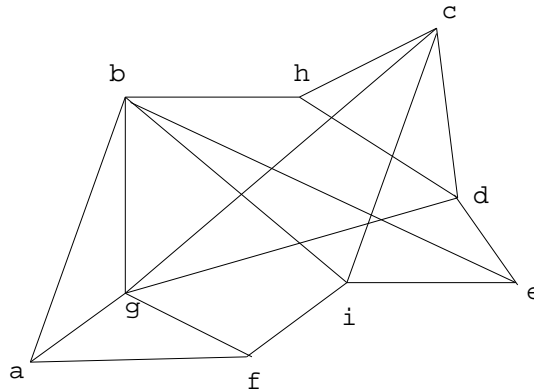
3. Consider the following arithmetic expression:

$$a * (b + c \uparrow d \uparrow 2)/(e + f * h \uparrow i - j * (k + 5)).$$

The hierarchy for evaluation of arithmetic expressions (from do first to do last) is: (1) "↑", (2) "∗" and "/", (3) "+" and "−". The inner parenthesis must be evaluated first, and operations with the same priority level are evaluated from left to right, except ↑, which is evaluated from right to left—for instance, $2/3 * 5$ means $(2/3) * 5$, but $2 \uparrow 3 \uparrow 5$ means $2 \uparrow (3 \uparrow 5)$.
 (a) Represent the given expression with a binary rooted tree.
 (b) Write it in Polish notation.
 (c) Write it in reverse Polish notation.

4. Nine coins are identical in appearance, but one is heavier than the others, which all weigh the same. Draw a decision tree that gives an algorithm that identifies the bad coin using only a pan balance.

5. Make a binary search tree for the following set of data in lexicographic order:

MAKE A BINARY SEARCH TREE FOR THE FOLLOWING SET OF DATA IN LEXICOGRAPHIC ORDER