1996 Paper 5 Question 7

Prolog for Artificial Intelligence

An *ordered integer binary search tree* (or OIBS tree) is either empty or a tuple (T, N, U), where T and U are also OIBS trees and N is an integer. Every node in T has a value less than N, which in turn is less than the value of every node in U.

(a) Give two Prolog terms which are suitable for representing an empty OIBS tree and a node in the OIBS tree respectively. [2 marks]

(b) Define a Prolog procedure `insert(Item, T, NT)`, where `Item` is an integer being inserted into OIBS tree `T`, producing an OIBS tree `NT`. If `Item` is already present in `T`, then `NT` equals `T`. [9 marks]

(c) Define a Prolog procedure `lookup(Item, T)`, where `Item` is to be looked for in OIBS tree `T`. A `lookup` goal will succeed if `Item` is found, or fail otherwise. [9 marks]