



EASTERN UNIVERSITY, SRI LANKA  
THIRD EXAMINATIN IN SCIENCE 2003/2004  
FIRST SEMESTER (November/December, 2004)  
CS304 Artificial Intelligence

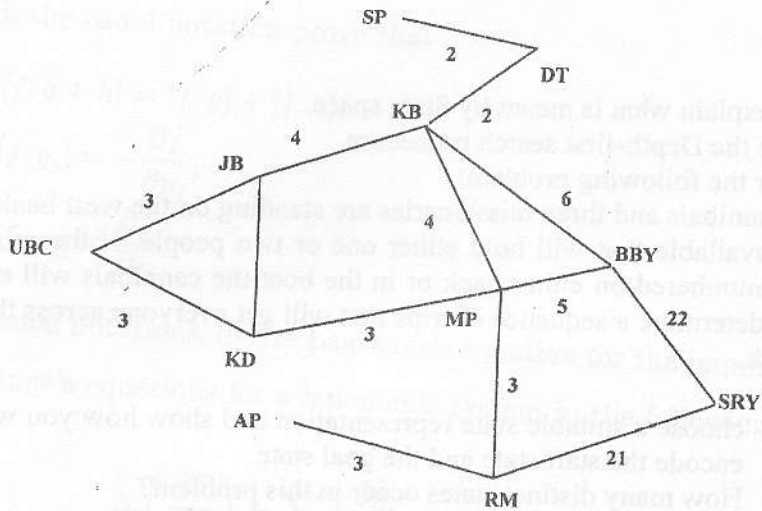
Answer all questions

Time allowed: 2 Hours

- Q1) Briefly explain what is meant by State space.  
Describe the Depth-first search procedure  
Consider the following problem:  
Three cannibals and three missionaries are standing on the west bank of a river. A boat is available that will hold either one or two people. If the missionaries are ever outnumbered-on either bank or in the boat-the cannibals will eat them. You have to determine a sequence of trips that will get everyone across the river to the east bank.
- choose a suitable state representation and show how you would use it to encode the start state and the goal state
  - How many distinct states occur in this problem?
  - Show the state space graph. Do not draw any illegal state. Number all distinct states and terminates the search at any repeated state (in any path). Clearly mark a possible path from the start state to the goal state.

- Q2) For each of the following, give a tree (there is at most one arc into any node) contains at most 15 nodes, and has at most two arcs out of any node.
- Give a graph where depth-first search is much more efficient (expands fewer nodes) than breadth-first search
  - Give a graph where breadth-first search is much better than depth-first search
  - Give a graph where A\* search is more efficient than either depth-first search or breadth-first search

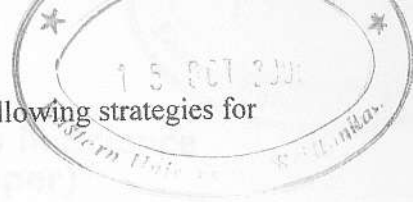
Consider the graph (not drawn to scale) with arc lengths shown on the arcs:



Suppose you have the following heuristic values for the distance to SP:

$h(SP) = 0$	$h(DT) = 2,$	
$h(KB) = 3,$	$h(JB) = 3,$	
$h(UBC) = 5,$	$h(KD) = 6$	
$h(MP) = 7,$	$h(BBY) = 8,$	
$h(AP) = 8,$	$h(RM) = 9$	$\&h(SRY) = 29$

Using A\* search strategy to find a path from UBC to SP



- Q3) Describe the resolution proof procedure, also describe the following strategies for resolution and compare them
- a) The set of support strategy
  - b) The unit preference strategy
  - c) The linear input strategy

Consider the following statement:  
The law says that it is a crime for an American to sell weapons to hostile nations. The country, Nano, an enemy of America, has some missiles, and all of its missiles were sold to it by colonel West, who is American

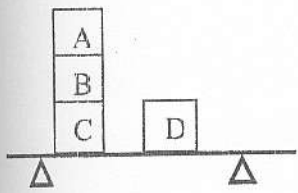
Represent these sentences as predicate calculus expression, and change them into clausal form, then answer the question "is West a criminal?"  
What is the strategy you have used for the above proof?

- Q4) Describe the major principles involved in goal stack planning

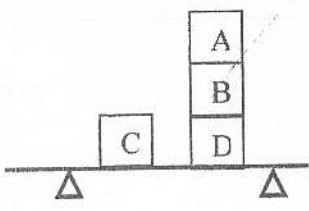
Consider a block world consisting of a number of blocks on a table and robot-arm which can handle only one block at a time.

Give an algorithm that would make the robot-arm transfer the block world from a given initial state to a given goal state assuming that there is enough space on the table and that the robot-arm is empty in the initial state and should be empty in the final state.

Show step by step how your algorithm would transfer the block world from initial state to the goal state as shown in the following below:



Initial



Goal: