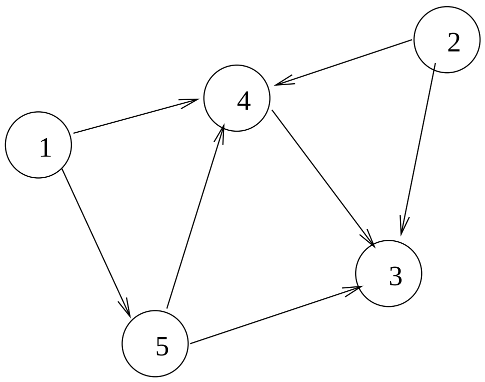
CSE 373 Midterm April 24, 1998

1. Write pseudocode for a function that moves the smallest item on a given list to be the first node of the list and returns a pointer to the new list. If the list is empty then your function should return NIL. The original list is accessed by a pointer to its first element. Your function is allowed to destroy the original list.

2. (a) Show the data structure representing the directed graph drawn below.

   (b) In class we presented a marking algorithm based on depth-first search for determining the set of vertices reachable from a given vertex in a directed graph. The algorithm uses an array of bits to keep track of the vertices reached so far. Give the order in which the bits of this array are set to 1 when the algorithm is used to determine the vertices reachable from vertex 1.



3. This question concerns the Stack Abstract Data Type.A letter means *Push* and an asterisk means *Pop* in the sequence HI*ST**OR*Y***. Give the sequence of values returned by the *Pop* operations.

4. Using pseudocode give a recursive algorithm $Count(r, a, b)$ which determines the number of nodes in a binary search tree whose values are greater than or equal to a and less than or equal to b, where a and b are integers. Here r is a pointer to the root of the tree. You may assume that no two keys in the tree are equal. Your algorithm should avoid exploring subtrees that cannot possibly contain values lying between a and b.