CS 6901 Capstone Exam Systems Spring 2014

3) Consider a system with 3 resources (A, B, C) in quantity (7, 7, 6). The Banker's Algorithm is used to allocate resources and it has the following SAFE state:

Available: A B C
1 2 2

Process	Allocation			Max			Need		
	A	B	C	A	B	C	A	B	C
P0	2	1	1	2	4	4	0	3	3
P1	1	1	2	2	4	4	1	3	2
P2	3	2	1	6	6	1	3	4	0
P3	0	1	0	0	3	2	0	2	2

a) Justify why the current state is safe.
b) For each part, write your choices on your solution sheet. You do not need to justify your answers.
i) Select a process and a request of a single instance of an available resource where the request will be denied. The resource must be within the specified need for that process.

Process _____ Resource _____

ii) Select a process and a request of a single instance of an available resource where the request will be allowed.

Process _____ Resource _____

CS 6901 Capstone Exam Data Structures and Algorithms Spring 2014
Choose any 2 problems.

1) Write the function
insert_double (*NodeType head, int key)
to insert a new integer key into a sorted non-empty doubly linked list beginning at address head. Declare all data structures.

2) Write the function
int count2children(treeptr p);
that is given a (possibly empty) binary tree and returns the number of nodes in the tree that have both a left child and a right child.

3) Solve the recurrence relation $T(n) = 2T(n/2) + 5$ where $T(1) = 1$ and $n = 2^k$ for a nonnegative integer k. Your answer should be a precise function of n in closed form. (An asymptotic answer is not acceptable.) Justify your solution.

Theory Exam Spring 2014