CS 6901 Capstone Exam Systems 2613: Choose any 2 of the 3 problems.

1) Construct a combinational ciritia control input

(x), and a Soit integer output $(c_4c_3c_2c_1c_0)$. If x=1, the outputc is to be the difference of the integers b, while if x=0, the outputc is to be the usm of the integers a+b. You may use full adders and up to 4 additional gates. Draw the circuit diagram.

b) Continue the page reference string with at most 3 additional terms where iDPE sult in strictly fewer page faults than LRU.

c) Continue the page reference string with at most 5 additional terms whereace will result in strictly fewer page faults than FIFO.

CS 6901 Capstone Exam Data Structureall 2013: Choose any 2 problems.

- 1) Given a (possibly empty)nary search tree of integers, write an iterative function that inserts an integer x into the tree. Do not use recursion.
- 2) Consider the floowing quicksort code to sort an array of floats. The algorithm is begun by the call quicksort (a, 0, r1).

```
void quicksort(float a[], int first, int last)
// Sort a[first]..a[last]; original call: quicksort(a, 0, n-
{
   if (first < last) {
     int splitpt = partition(a, first, last);
     quicksort(a, first, splitpt - 1);
}</pre>
```

Theory Exam

1. Give a state diagram for deterministic finite automaton that recognizes the following language over $\Sigma = \{0, 1\}$:

{w: w has an even number of occurrences of the substring 01 artrassvan odd length}

2. Answer each of the following questions withly YES noto indicate whether or not the following languages are decidable on t guess if unsure, as wrong answers will lower your score!

Scoring:+2 points for correct answers; 0 points for no answers; -