# CSCI 305 HW0

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## 1 Regular Expressions and DFA

Either nothing or exactly one a followed by exactly one b; the ab pattern can be repeated. Example outputs: ab, abababababab, abababab

$\varepsilon$ |(ab)*

## 2 Set Operations

### 2.1 A ∪ B

{1,2,2,3,3,5}

### 2.2 A ∩ B

{2,3}

### 2.3 A \ B

{1}

## 3 Symbolic Notation

For all x's that are real, there exists a y that x that is greater than y and y in the subset z

## 4 Basic Algorithms and Data Structures

Assuming these are sorted least to greatest

### 4.1

If L is empty then make the node as head and return it.

If value of the element is smaller than the head node then this element to be inserted will now be the head.

In a loop starting at the head, check current value of each node, iterate until you find a node with a value greater than this new element to be inserted. Insert new node before node of greater value

This will be completed in O( n)

### 4.2

This can be achieved by using Binary Search. O( logn)

Check the value of the middle element of the array

If it is greater than mid value, check the value of the middle of mid and end of array.

If it is less than mid value, check the value of the middle of mid and beggining of array

repeat until 'mid' is equal to element you are trying to find, if it is never equal, the value does not exist in the array.

## 5 Code Understanding

This code takes a array (size 12 in this case) with each element being a random size of 1-10 and finds the largest and smallest value.