Week 3 Forecast

1. Write pseudo code of binary search algorithm

Steps

1. Input array a size n and x to be found
2. Initialize low = 0 high = n-1
3. Do until low ≥ high
   mid = (low + high)/2
   if a[mid] == x print mid, go to end
   else
      if a[mid] < x low = mid+1
      else high = mid-1
4. Print "x not found"
5. End

2 Analysis pseudo code of step 1.
2.1 Space complexity
2.2 Time complexity in base case
2.3 Time complexity in worst case

2.1 Space complexity

array is given
variables created: mid, low, high
$A = 3$ //

2.2 Base case

x at N/2 1 comparison
x at N/4, 3N/4 2 comparisons
x at N/8, 3N/8, 5N/8, 7N/8 3 comparisons

i 1 comparison = 1
i 2 comparison = 2
i 3 comparisons = 4
} 2^{i-1}

$A = O(\lg n)$

2.3 Worst case

x is at a[0] or a[n-1]
comparisons required $\lg(n)$
$A = O(\lg n)$