Homework 2

Foundations of Algorithms

Divesh Badod

1. Time complexity of is .

The recurrence relation in terms of addition is given by:

c = Constant

Solving by iteration

←Identifying the pattern

Let

1. Proof: - By Mathematical Induction

* Observer that when we have
* Assume for

1. a b c Electronic Submission

d. Time complexity of is

1. a. An algorithm runs in pseudo-polynomial time if its running time is a [polynomial](https://en.wikipedia.org/wiki/Polynomial) in the numeric value of the input but not necessarily in the length of the input. In general, the numeric value of the input is exponential in the input length, which is why a pseudo-polynomial time algorithm does not necessarily run in polynomial time with respect to the input length.

b. Time complexity of is – not polynomial in time. Larger inputs take a large amount of time. Hence it is not a pseudo-polynomial time algorithm.

c. Time complexity of is – not polynomial in time. Larger inputs require the same amount of bits to represent the input. Hence it is not a pseudo-polynomial time algorithm.

d. Time complexity of is – logarithmic in time. For larger inputs it is sub-linear in time but it would be impractical for the algorithm to represent the inputs in terms of length because it is exponential in terms of length. Hence it is a pseudo-polynomial time algorithm.

1. a.

← Identify the pattern

Let

b.

←Identify the pattern

Let

1. a.

←Identify the pattern

Let

b.

Assuming

←Identify the pattern

Let

c.

Assuming

←Identify the pattern

Let

1. a.

←Identify the pattern

Let

So, if and if

b.

←Identify the pattern

Let

if and if

c.

←Identify the pattern

Let

if and if

d.

←Identify the pattern

Let