Foundations of Algorithms

Homework 1

Divesh Badod

1. Below are the functions ranked by their order of growth:

Assuming that all the constants are smaller than x

1. a. Proof: -

Consider N = 1 and c = 1

Suppose

→

b. Proof: -

Consider N = 0 and c = 2

Suppose

→

c. Proof: -

Consider N = 5 and c = 4

Suppose

→

1. a. Proof: -

Consider N = 1 and c = 1

Suppose

→

Given that we can replace as

b. Proof: - Given a function for the domain

There exists andsuch that implies

Consider and

Suppose

We know that

1. a. Proof: -

Consider and

Given:

Since ) is constant we can say that

b. Proof: -

Consider N=1 and c=1

Given:

Since is in we can say that

1. Electronic Submission and the number at which the function starts working slow is 28
2. a. Proof: - By Mathematical Induction

Observe that when we have

from the recurrence above.

from the recurrence above.

=from the recurrence above

=

Assume for

For

from the recurrence above

from the induction hypothesis

from the recurrence above.

Hence for if then .

b. Proof: - By Strong form of induction

Observe that when ,

when ,

Assume when , if

From the recurrence in question 6

result of the previous proof

Hence, for any

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