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CSCI2100 Assignment 1

Question 1

Total frequency:

Time complexity:

Question 2

1. By definition, we have for any

The product of and resulting an inequality as follow

for any

Then we have

1. By definition, we have for any

The maximum of and resulting an inequality as follow

Given both and are nonnegative function, we have

and

Thus, and holds the inequality for any

Question 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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Question 4

1. We have that , ,

Since , we have that

1. We have that , ,

Since , we have that

1. We have that , ,

Since , we have that

Question 5

runs in a constant time, thus,

grows in , thus,

rewrite as , thus,

known as , thus,

The growth rate, therefore, is

Question 6

1. Suppose holds for

For , we have

To make , must statisfy that

By induction, for any , we obtain , therefore,

1. We have that , ,

Since , we have that

Question 7

By the definition of Big-Omega, we obtain as follow

, where

1. Given , we have and for some constant

grow faster than , thus by the sum property we obtain

1. Given , we have and

grow faster than , thus by the sum property we obtain

1. Given , we have and for some constant

grow faster than , thus by the sum property we obtain