x=0

for i=0 in m,

x=x+S[i]

NANYANG TECHNOLOGICAL UNIVERSITY
School of Electrical & Electronic Engineering

IE2108 Data Structures and Algorithms

Tutorial No. 2 (Sem 1, AY2022-2023)

1. Write an algorithm that returns the sum of first m elements of an array S.

2. Write an algorithm that outputs the smallest and largest values in the array S which has m unique elements.

3. Given an array $s[1], s[2], \cdots, s[n]$ such that $n > 1$ and $s[i] \leq s[i+1]$ for all i. Write an algorithm that insert an input value x into the array so that $s[i] \leq s[i+1]$ for all i.

4. Order the following functions according to their order of growth (from the lowest to the highest).

   $n!,\ 5\lg(n+100)^{10},\ 2^{2n},\ n^4+3n^3+1,\ n\lg n,\ 3^n$

   5 1 7 4 3 2 6

5. Prove the following assertion:
   If $f(n) = O(g(n))$, then $g(n) = \Omega(f(n))$.

6. Prove that $\lg(n^k + c) = \Theta(\lg n)$ for every fixed $k > 0$ and $c > 0$. Note that $\lg x = \log_2 x$.

7 (if) If $f(n) = 2n^2 + 1$, prove that $f(n) = O(n^2)$.
(ii) If $f(n) = 2^{n+2}$, prove that $f(n) = O(2^n)$.

$O(n^2) = 3n^2$