No 1

Consider the following algorithm.

ALGORITHM *Mystery*(n)
//Input: A nonnegative integer n
$S \leftarrow 0$
for $i \leftarrow 1$ **to** n **do**
$S \leftarrow S + i * i$ → basic operation
return S

a. What does this algorithm compute? ~~Algori~~ nilai dari penjumlahaan kuadrat dari i
b. What is its basic operation? $S \leftarrow S + i * i$
c. How many times is the basic operation executed? n
d. What is the efficiency class of this algorithm?
e. Suggest an improvement, or a better algorithm altogether, and indicate its efficiency class. If you cannot do it, try to prove that, in fact, it cannot be done.

Jawab: c). code for $i \leftarrow 1$ to n bisa dirubah menjadi $\sum_{i=1}^{n}$
jadi, karena basic operation ada didalam operasi for maka.
Jumlah eksekusi $= \sum_{i=1}^{n} 1 = n$
d) $(n) \in \Theta(n)$ → linear

No 2

Consider the following algorithm.

1 **ALGORITHM** *Secret*($A[0..n-1]$)
2 //Input: An array $A[0..n-1]$ of n real numbers
3 $minval \leftarrow A[0]$; $maxval \leftarrow A[0]$
4 **for** $i \leftarrow 1$ **to** $n-1$ **do**
5 **if** $A[i] < minval$ ← basic operation
6 $minval \leftarrow A[i]$ ← basic operation
7 **if** $A[i] > maxval$
8 $maxval \leftarrow A[i]$
9 **return** $maxval - minval$

a) Algoritma tersebut menghitung selisih dari nilai maksimum dari A dan nilai minimum dari A
b) basic operation: $minval \leftarrow A[i]$ atau if $A[i] < minval$

Answer questions (a)–(e) of Problem 4 about this algorithm.

c.) Jumlah basic operation dieksekusi : $\sum_{i=1}^{n-1} 1 = n-1-1+1 = n-1$
d) efficiency class dari $(n-1)$ adalah linear
e). Algoritma tersebut dapat diperbaiki dg mengganti code "if" pada baris ke 7 dg perintah "else"

No 3

Consider the following algorithm.

ALGORITHM *Enigma*($A[0..n-1, 0..n-1]$)
//Input: A matrix $A[0..n-1, 0..n-1]$ of real numbers
for $i \leftarrow 0$ **to** $n-2$ **do** $\longrightarrow \sum_{i=0}^{n-2}$
  for $j \leftarrow i+1$ **to** $n-1$ **do** $\longrightarrow \sum_{j=i+1}^{n-1}$
    if $A[i, j] \neq A[j, i]$
      return false
return true

Answer questions (a)–(e) of Problem 4 about this algorithm.

a) Algortma tersebut untuk mengecek apakah isi kolom ke ~~A~~[i][j] pada matrix A sama dengan isi kolom ke [j][i]

b) basic operation if $A[i,j] \neq A[j,i]$

c) Jumlah basic operation dieksekusi $\sum_{i=0}^{n-2}\sum_{j=i+1}^{n-1} 1 = \sum_{i=0}^{n-2} (n-i)-(i+1)+1$

$= \sum_{i=0}^{n-2} n-i-i-1+1 = \sum_{i=0}^{n-2} n-i+1 \approx n^2$

No 4

. Consider the following version of an important algorithm that we will study later in the book.

ALGORITHM *GE*($A[0..n-1, 0..n]$)
//Input: An $n \times (n+1)$ matrix $A[0..n-1, 0..n]$ of real numbers
for $i \leftarrow 0$ **to** $n-2$ **do**
  for $j \leftarrow i+1$ **to** $n-1$ **do**
    for $k \leftarrow i$ **to** n **do**
      $A[j, k] \leftarrow A[j, k] - A[i, k] * A[j, i] / A[i, i]$ $\longrightarrow$ basic operation

a. Find the time efficiency class of this algorithm. $\rightarrow$ ~~lop~~ perulangan rangkap 3,

b. What glaring inefficiency does this pseudocode contain and how can it be eliminated to speed the algorithm up?

maka cara mudahnya time efficiency mendekati n^3

No 5

For each of the following pairs of functions, indicate whether the first function of each of the following pairs has a lower, same, or higher order of growth (to within a constant multiple) than the second function.

a. $n(n+1)$ and $2000n^2$ **b.** $100n^2$ and $0.01n^3$

c. $\log_2 n$ and $\ln n$ **d.** $\log_2^2 n$ and $\log_2 n^2$

e. 2^{n-1} and 2^n **f.** $(n-1)!$ and $n!$

b) $100n^2 \to$ kuadratik, $0{,}01n^3 \to$ kubik } $100n^2$ order of growth nya lebih rendah

d) $\log_2^2 n \to \log^2 n$, $\log_2 n \to \log n$ } $\log^2 n$ lebih tinggi

kelas

a. $n(n+1) \to$ quadratik, $200n^2 \to$ quadratik } mempunyai order of growth yang sama

c. $\log_2 n \to \log n$, $\ln n = \log_e n \to \log n$ } "

e. $2^{n-1} < 2^n \to$ order of growth dr 2^{n-1} lebih kecil

No 6

- Tentukan apakah pernyataan berikut benar atau salah

a. $n(n+1)/2 \in O(n^3)$ benar **b.** $n(n+1)/2 \in O(n^2)$ salah

c. $n(n+1)/2 \in \Theta(n^3)$ salah **d.** $n(n+1)/2 \in \Omega(n)$ benar

a) $n(n+1)/2 < n^3$

$n(n+1)/2 \downarrow$ kuadratik, $n^3 \downarrow$ kubik

$n(n+1)/2 \in O(n^3)$ benar

b) $n(n+1)/2 = n^2$

$n(n+1)/2 \downarrow$ kuadratik, $n^2 \downarrow$ kuadratik

berarti $n(n+1)/2 \in \Theta(n^2)$

c) benarnya seperti a

d) $n(n+1)/2 > n$

$n(n+1)/2 \downarrow$ kuadratik, $n \downarrow$ linear

$n(n+1)/2 \in \Omega(n)$