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**Lab W1D2**

**Question 1**. **Comparing Algorithms**

**A, Pseudo Code for all Three Algorithms.**

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First Algorithm Number Of Operations

Algorithm maxDiff (A,n)

Input array A of n integers

Output maxDiff

B 🡨 new Array of evenValues

maxDiff 🡨 0 --------------------------------------------------------------------- 1

for i 🡨 0 to n -1 do ------------------------------------------------------------ 2 + n

if A[i] = even ----------------------------------------------------------------- 2n

evenValues [i] 🡨 A[i] ------------------------------------------------------- 3

m 🡨 n -1 ----------------------------------------------------------------------- 2

for i 🡨 0 to m do. ------------------------------------------------------------ 2 + n

for j 🡨 i + 1 to n-1 do ------------------------------------------------------ 3 + n

if evenValues [i] – evenValues [i] > maxDiff then ------------------ 4n

maxDiff 🡨 Math.abs(evenValues[i] – evenValues[i]) ------------- 4n

return maxDiff ------------------------------------------------------------------ 1

Total 14n + 12

Second Algorithm Number of Operations

Algorithm maxDiff (A,n)

Input array A of n integers

Output maxDiff

maxDiff 🡨 0 ---------------------------------------------------------- 1

for i 🡨 0 to n-1 do ------------------------------------------------ 2 + n

for j 🡨 i + 1 to n- 1 do --------------------------------------------- 3 + n

if A[i] and A[j] is even ------------------------------------------- 2n

if ( Math.abs ( a[i] – a [j] > maxDiff)) then ----------------- 4n

maxDiff 🡨 Math.abs( a[i] – a[j]) --------------------------- 3n

return maxDiff ------------------------------------------------------- 1

Total 12n + 6

Third Algorithm Number Of Operations

Algorithm maxDiff (A,n)

Input array A of n integers

Output maxDiff

max 🡨 0 ------------------------------------------------------------------- 1

min 🡨 0 ------------------------------------------------------------------- 1

for i 🡨 0 to n – 1 do ------------------------------------------------- 2 + n

if A [i] is even then ------------------------------------------------- n

if A[i] > max then ------------------------------------------------- 2n

max 🡨 A[i] ------------------------------------------------- 2

if A[i] < min ------------------------------------------------- 2n

min 🡨 A[i] ------------------------------------------------- 2

return max – min ------------------------------------------------- 1

Total 6n + 9

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**Question 2**

|  |  |
| --- | --- |
| log(logn) | Θ(log(logn)) |
| 10 ,1 | Θ (1) |
| log n ,ln n | Θ (ln n) |
| log^2n | Θ ( log^2 n) |
| n ^ 1/k (k > 3) | Θ ( n ^ 1/k) |
| n ^ 1/3 | Θ ( n ^ 1/3) |
| n ^ 1/3 log n | Θ (n ^ 1/3 log n) |
| n ^ ½ | Θ (n ^ 1/3) |
| n^ ½ log n | Θ( n^ ½ log n) |
| n | Θ(n) |
| nlogn, logn^n | Θ (nlogn) |
| n ^2 | Θ (n^2) |
| n^3 | Θ ( n^3) |
| n^k (k > 3) | Θ(n^k) |
| 2^n | Θ( 2^n) |
| 3^n | Θ( 3^n) |
| n! | Θ( n!) |
| n^n | Θ( n^n) |