## Problem 1: Loop 1A:

for (i = 1; i <= n; i++)

for (j = 1; j <= 10000; j++)

sum = sum + j;

**Time Complexity:**

|  |  |
| --- | --- |
| **Expression** | **Frequency** |
| i=1; | 1 |
| i<=n; | n+1 |
| i++; | n |
| j=1; | n |
| j<=10000; | 10000n+n |
| j++; | 10000n |
| sum=sum+j; | 10000n |

Time complexity expression-> T(n)= 30004n+2

**Big-Oh -> O(n) or Big-Oh = n**

## Loop 1B:

for (i = 1; i <= n; i++)

for (j = 1; j <= n; j++)

sum = sum + j;

**Time Complexity:**

|  |  |
| --- | --- |
| **Expression** | **Frequency** |
| i=1; | 1 |
| i<=n; | n+1 |
| i++; | n |
| j=1; | n |
| j<=n; | n^2+n |
| j++; | n^2 |
| sum=sum+j; | n^2 |

Time complexity expression-> T(n)= 3(n^2)+4n+3

**Big-Oh -> O(n^2) or Big-Oh = n^2**

# Problem 2:

## Loop 2B:

for (i = 1; i <= n; i++)

for (j = 1; j <= n; j++)

for (k = 1; k <= j; k++)

sum = sum + k;

**Time Complexity:**

|  |  |
| --- | --- |
| **Expression** | **Frequency** |
| i=1; | 1 |
| i<=n | n+1 |
| i++ | n |
| j=1 | n |
| j<=n | n^2+n |
| j++ | n^2 |
| k=1 | n^2 |
| k<=j | (n(n+1)(2n+1))/6 + (n^2) |
| k++ | n(n+1)(2n+1)/6 |
| sum=sum+k | n(n+1)(2n+1)/6 |

Time complexity-> T(n)= (1/2) n^3 + (11/2) n^2 + (9/2) n +2

**Big-Oh-> O(n^3) or Big-Oh= n^3**