

3-)

(12)

Step/Exec	freq	Total
Val = 0	1	1
for (i = 0; i < arr_len/2; i++)	1	1
for (j = 0; j < arr_len/2; j++)	arr_len/2 + 1	arr_len/2 + 1
for (i = 0; i < arr_len/2; i++)	arr_len/2 + 1	arr_len/2 + 1
Val = Val + arr[i]	2	2
for (i = n/2; i < arr_len; i++)	1	1
for (j = n/2; j < arr_len; j++)	arr_len - arr_len/2 + 1	arr_len - arr_len/2 + 1
arr[i] = arr[j]	arr_len - arr_len/2	arr_len - arr_len/2
val >= 0	1	1
return 1 / return -1	1	1

$$Total = 2arr\_len + 9$$

$$T_{\text{worst}} = T_{\text{Avg}} = T_{\text{Best}} = O(arr\_len)$$

$$= \Omega(arr\_len)$$

$$= \Theta(arr\_len)$$

$$= \Theta(n)$$

4-)

Step/Exec	freq	Total
C = 0	1	1
for (i = 1 to n)	n + 1	2n + 2
for (j = 1 to n)	n * n + 1	2n <sup>2</sup> + 2
for (k = 1 to 2j)	n <sup>3</sup> * (2j + 1)	4n <sup>3</sup> + 2n <sup>3</sup>
C = C + 1	2n <sup>3</sup>	4n <sup>3</sup>
return C	1	1

$$Total = 2n^3 + 2n^3 + 4n^3 + j + 4n^3 + 2n^2 + 6$$

$$= (8j + 4)n^3 + 2n^2 + 6$$

I can write  $n^4$  instead of  $j$  because in second loop  $j$  goes to  $n$ .

$$Total = (8n^4 + 4n^3 + 2n^2 + 6)$$

$$T_{\text{best}} = T_{\text{worst}} = T_{\text{Avg}} = O(n^4) = \Omega(n^4) = \Theta(n^4)$$