Theoretical Analysis of Multiply

let $C(n)$ be the number of calculations needed to do the function multiply for the array of n elements

$C(1) = I \times 1' + \text{dotProduct}(1) \times 1' = 1 + (I \times 4 \times 1) \times 1$
$= 5$

$C(2) = I \times 2^2 + \text{dotProduct}(2) \times 2^2 = 4 + (I \times 4 \times 2) \times 2^2$
$= 36$

$C(3) = I \times 3^2 + \text{dotProduct}(3) \times 3^2 = 9 + (I \times 4 \times 3) \times 3^2$
$= 117$

$C(n) = n^2 + (4n) \times n^2 = n^2 + 4n^3 \Rightarrow O(n^3)$