1.

The outer and inner loops run from 1 to n.

The no. of iterations that occur :

for $i=1$, inner loop runs n times

for $i=2$, inner loop runs n times

. . .

for $i=n$, inner loop runs n times

Total no. of iterations can be calculated by adding the no. of iterations of the inner loop for each value of i from 1 to n.

Mathematically,

$$\sum_{i=1}^{n} \sum_{j=1}^{n} 1$$

From the above, the inner sum denotes the no. of times the inner loop runs for a specific value of i, and the outer sum denotes the no. of times the outer loop runs.

∴ Multiplying the terms,

$$\sum_{i=1}^{n} \sum_{j=1}^{n} 1 = \sum_{i=1}^{n} (n)$$

Simplifying the expression,

$$\sum_{i=1}^{n} (n) = n \cdot \sum_{i=1}^{n} 1$$

$$n \cdot \sum_{i=1}^{n} = n \cdot n = n^2$$

∴ Runtime of the algorithm is $O(n^2)$.