function x = f(n)
   x = 1;
   for i = 1 : n
     for j = 1 : n
      x = x + 1;

Sailokeswari Polarapu
UTAID: 1002190695

1). Find the runtime of the algorithm mathematically (I should see summations).

Let's Consider from the given algorithm Consists of nested loop that runs from 1 to n. Here, the inner loop increments x by 1 in each iteration i,e x = x + 1.

Mathematically we can represent it as follows

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

where, the inner summation $\sum_{i=1}^{n} \sum_{j=1}^{n}$ Shows the number of times inner loops runs for each pass of outer loop.

So, $\sum_{j=1}^{n} 1 \Rightarrow n$ Consider it as 'n'

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

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

$$T(n) = 1 + n \cdot n$$

$$T(n) = 1 + n^2$$

Therefore,
the runtime of the algorithm is $O(n^2)$ from derived mathematical summation.