Q. 1. Estimate the growth rate for the following code snippet. Show all your work to get full (or any) points.

```java
for (i = N; i >= 0; i--)
    for (j = 0; j <= i; j++)
    {
        k=10;
    }
```

The assignment statement 'k=0' runs
(N+1)+(N)+(N-1)+(N-2)+..............1 times

\[ \sum_{i=0}^{N} (i+1) \]
\[ = \sum_{i=0}^{N} i + \sum_{i=0}^{N} 1 \]
\[ = \frac{N(N+1)}{2} + (N+1) \]
\[ = \frac{2(N+2)(N+1)}{2} \]

So we have \( \frac{N+2}{2} \) steps giving us \( O(N^2) \).