4.3-1.

Show that the solution of $T(n) = T(n-1) + n$ is $O(n^2)$.

Answer.

$$
\begin{aligned}
T(n) &= T(n-1) + n \\
&= T(n-2) + (n-1) + n \\
&= T(n-3) + (n-2) + (n-1) + n \\
&= \cdots \\
&= T(0) + 1 + 2 + \cdots + (n-1) + n \\
&= T(0) + \frac{n(n+1)}{2} \\
&= O(n^2)
\end{aligned}
$$