

$$\begin{aligned}
E[T(n)] &\leq \sum_{k=1}^n E[X_k T(\max(k-1, n-k))] + O(n) \\
&= \sum_{k=1}^n E[X_k] E[T(\max(k-1, n-k))] + O(n) \\
&= \sum_{k=1}^n \frac{1}{n} E[T(\max(k-1, n-k))] + O(n)
\end{aligned}$$