



# Randomized quicksort analysis

Let  $T(n)$  = the random variable for the running time of randomized quicksort on an input of size  $n$ , assuming random numbers are independent.

For  $k = 0, 1, \dots, n-1$ , define the *indicator random variable*

$$X_k = \begin{cases} 1 & \text{if PARTITION generates a } k : n-k-1 \text{ split,} \\ 0 & \text{otherwise.} \end{cases}$$

$E[X_k] = \Pr\{X_k = 1\} = 1/n$ , since all splits are equally likely, assuming elements are distinct.