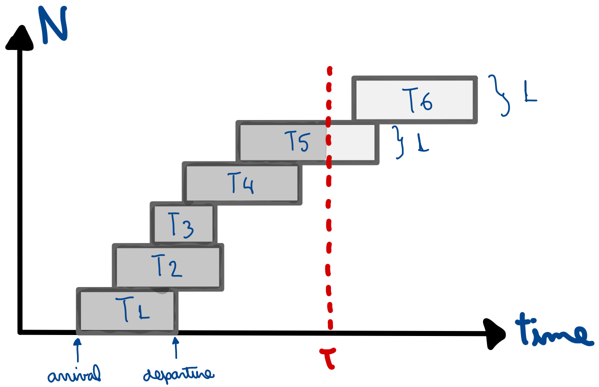

$A(\tau) = N^{\circ}$ of arrivals $= T_1 + \cdots + T_5$

$C(\tau) = N^{\circ}$ of completions $= T_1 + \cdots + T_4$

$$\begin{cases} \sum_{i \in C(t)} T_i \le A \le \sum_{i \in A(t)} T_i \\ A = \int_0^t N(s)\, ds \end{cases}$$

$$\sum_{i \in C(t)} T_i \le \int_0^t N(s)\, ds \le \sum_{i \in A(t)} T_i$$

dividing by t throughout, we get

$$\frac{\sum_{i \in C(t)} T_i}{C(t)} \cdot \frac{C(t)}{t} \le \frac{\int_0^t N(s)\, ds}{t} \le \frac{\sum_{i \in A(t)} T_i}{A(t)} \cdot \frac{A(t)}{t}$$

taking limits as $t \to \infty$

$$\underbrace{\lim_{t\to\infty} \frac{\sum_{i \in C(t)} T_i}{C(t)}}_{\bar{T}\ \text{Time Avg}} \cdot \underbrace{\lim_{t\to\infty} \frac{C(t)}{t}}_{X} \le \underbrace{\lim_{t\to\infty} \frac{\int_0^t N(s)\, ds}{t}}_{\bar{N}\ \text{Time Avg}} \le \underbrace{\lim_{t\to\infty} \frac{\sum_{i \in A(t)} T_i}{A(t)}}_{\bar{T}\ \text{Time Avg}} \cdot \underbrace{\lim_{t\to\infty} \frac{A(t)}{t}}_{\lambda}$$

$$\bar{T} X \le \bar{N} \le \bar{T} \lambda$$

$\lambda = X$

$$\boxed{\bar{N} = \bar{T} \lambda}$$