$$P_n = \rho^n P_0$$

$$\sum_{n=0}^{\infty} P_n = 1$$

$$\rho < 1$$

$$P_0 = 1 - \frac{\lambda}{\mu}$$

$$N = \frac{\lambda}{\mu - \lambda}$$

$E[N_Q]$:

N = N° of jobs in system

N_Q = N° of jobs in queue

N_S = N° of jobs in server

$$N = N_Q + N_S$$

$$N_Q = N - N_S$$

$$N_Q = N - \lambda/\mu$$

$$N_Q = \frac{\lambda}{(\mu - \lambda)} - \frac{\lambda}{\mu}$$

by Little's Law: $N_S = \lambda E[S]$

$$N_S = \lambda / \mu$$

$$N_Q = \frac{\lambda^2}{\mu(\mu - \lambda)}$$

$E[T]$: by Little's Law:

$$N = \lambda T$$

$$T = \frac{N}{\lambda}$$

$$T = \frac{1}{\mu - \lambda}$$

$E[T_Q]$: by Little's Law:

$$N_Q = \lambda T_Q$$

$$T_Q = \frac{N_Q}{\lambda}$$

$$T_Q = \frac{\lambda}{\mu(\mu - \lambda)}$$