Assignment 8

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Download all python codes from

https://github.com/pranav−159/ai1103_Probability_and_Random_variables/blob/main/Assignment_8/codes/experimental_verification_Assignment8.py

1 Problem

GATE 2021 (ME-SET1), Q.42 (ME section)
Consider a single machine workstation to which jobs arrive according to a Poisson distribution with a mean arrival rate of 12 jobs/hour. The process time of the workstation is exponentially distributed with a mean of 4 minutes. The expected number of jobs at the workstation at any given point of time is . . . (*round off to the nearest integer*).

2 Solution

For job arrival,

- It is distributed according to Poisson distribution.
- Its Rate parameter λ=12 jobs/hour

For Job completions,

- Job completion time is distributed exponentially with mean of 4 minutes
- Then we can assume that no. of job completions are distributed as Poisson distribution with rate parameter μ = 15 jobs/hour

Let $\rho = \frac{\lambda}{\mu}$,

In the case where both job completions and job arrivals are distributed by Poisson distribution,Expected no.of jobs at workstation is,

$$E(j) = \frac{\rho}{1-\rho} \tag{2.0.1}$$

In our case $\rho = \frac{\lambda}{\mu} = \frac{12}{15} = \frac{4}{5}$.

Substituting it in the (2.0.1) we get,

$$E(j) = 4 \tag{2.0.2}$$

$\therefore$ Expected no.of jobs at workstation is 4.

Parameter	Definition
λ	Poisson rate parameter for the arrival of jobs
μ	Poisson rate parameter for the completion of jobs
$E(j)$	Expected no. of jobs at workstation

TABLE 0: Parameters and their definitions used in the problem