

Answer to Question #84513 – Math – Statistics and Probability

There are two reservation counters for all ticket booking for customers, who arrive in a Poisson fashion at an average rate of 10 per hour. The service time for booking clerks at both the counters are exponentially distributed with mean of 5 minutes. These counters remain open for 12 hours per day.

Question

i) Find the hours of the day for which all the clerks are busy.

Solution

Two counters can serve:

$$\frac{2 \text{ customers}}{5 \text{ minutes}} = \frac{10 \text{ customers}}{25 \text{ minutes}}$$

So clerks are busy 25 minutes in one hour.

Then clerks are busy per day:

$$25 \cdot 12 = 300 \text{ min} = 5 \text{ hours}$$

Question

ii) Find the expected waiting time of customers in the queue.

Solution

Arrival rate:

$$\lambda = \frac{10}{1 \text{ hour}}$$

Service rate:

$$\mu = \frac{1}{5 \text{ min}} = \frac{12}{1 \text{ hour}}$$

The expected waiting time of customers in the queue:

$$W_q = \frac{\lambda}{2\mu(\mu - \lambda)} = \frac{10}{2 \cdot 12 \cdot (12 - 10)} = \frac{10}{48} = \frac{5}{24} \text{ hours} = 12.5 \text{ min}$$