Problem

A bank has one teller serving customers. On average, customers arrive at the bank at a rate of 15 customers per hour, following a Poisson distribution. The teller takes, on average, 3.2 minutes to serve each customer, following an exponential distribution. Assume an infinite queue length. Calculate the average number of customers waiting in line.

Solution

Given:

- Arrival rate (λ) = 15 customers per hour

- Service rate (μ) = 1 hour / 3.2 minutes per customer = 18.75 customers per hour

Using the queuing theory formula for the average number of customers waiting in line:

$$L = \frac{\lambda}{\mu - \lambda} = \frac{15}{18.75 - 15} = \frac{15}{3.75} = \mathbf{4}$$

Answer: 4