

## 4. Exercise: People in the park

### Exercise: People in the park

2/2 points (graded)

Busy people arrive at the park according to a Poisson process with rate  $\lambda_1 = 3$ /hour and stay in the park for exactly  $1/6$  of an hour. Relaxed people arrive at the park according to a Poisson process with rate  $\lambda_2 = 2$ /hour and stay in the park for exactly half an hour. The arrivals of busy and relaxed people are independent processes. An observer visits the park at a specific time and sees  $B$  busy and  $R$  relaxed people at the park at that moment.

For both parts below, use standard notation. If your answer involves the exponential function, use notation such as  $e^{(3)}$ .

a) Find that probability that  $B = 0$ . *Hint:* Think about what must have happened in the immediate past. Recall also the formula for the Poisson PMF with parameter  $\lambda$ :

$$\frac{\lambda^k e^{-\lambda}}{k!}, \quad \text{for } k = 0, 1, 2, \dots$$

$\mathbf{P}(B = 0) =$   ✓ Answer:  $e^{(-0.5)}$

b) Find the probability that  $B + R = 1$ .

$\mathbf{P}(B + R = 1) =$   ✓ Answer:  $1.5 \cdot e^{(-1.5)}$

STANDARD NOTATION

#### Solution:

a) The busy people that the observer sees are exactly those busy people who arrived during the last  $(1/6)$ th of an hour. It is therefore a Poisson random variable with parameter  $3 \cdot (1/6) = 1/2$ . The desired probability is  $e^{-1/2}$ .

b) By the same argument,  $R$  is an independent Poisson random variable with parameter  $2 \cdot (1/2) = 1$ . Thus,  $B + R$  is a Poisson random variable with parameter  $1.5$ . Using the formula for the Poisson PMF,

$$\mathbf{P}(B + R = 1) = 1.5e^{-1.5}.$$

提交 你已经尝试了1次 ( 总共可以尝试3次 )

❗ Answers are displayed within the problem

## 讨论

主题: Unit 9 / Lec. 23 / 4. Exercise: People in the park

显示讨论