

1. Nov/2023/Paper_9709/61/No.3

A website owner finds that, on average, his website receives 0.3 hits per minute. He believes that the number of hits per minute follows a Poisson distribution.

(a) Assume that the owner is correct.

(i) Find the probability that there will be at least 4 hits during a 10-minute period. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Use a suitable approximating distribution to find the probability that there will be fewer than 40 hits during a 3-hour period. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

A friend agrees that the website receives, on average, 0.3 hits per minute. However, she notices that the number of hits during the day-time (9.00 am to 9.00 pm) is usually about twice the number of hits during the night-time (9.00 pm to 9.00 am).

- (b) (i) Explain why this fact contradicts the owner's belief that the number of hits per minute follows a Poisson distribution. [1]

.....

.....

.....

.....

.....

.....

.....

.....

- (ii) Specify separate Poisson distributions that might be suitable models for the number of hits during the day-time and during the night-time. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

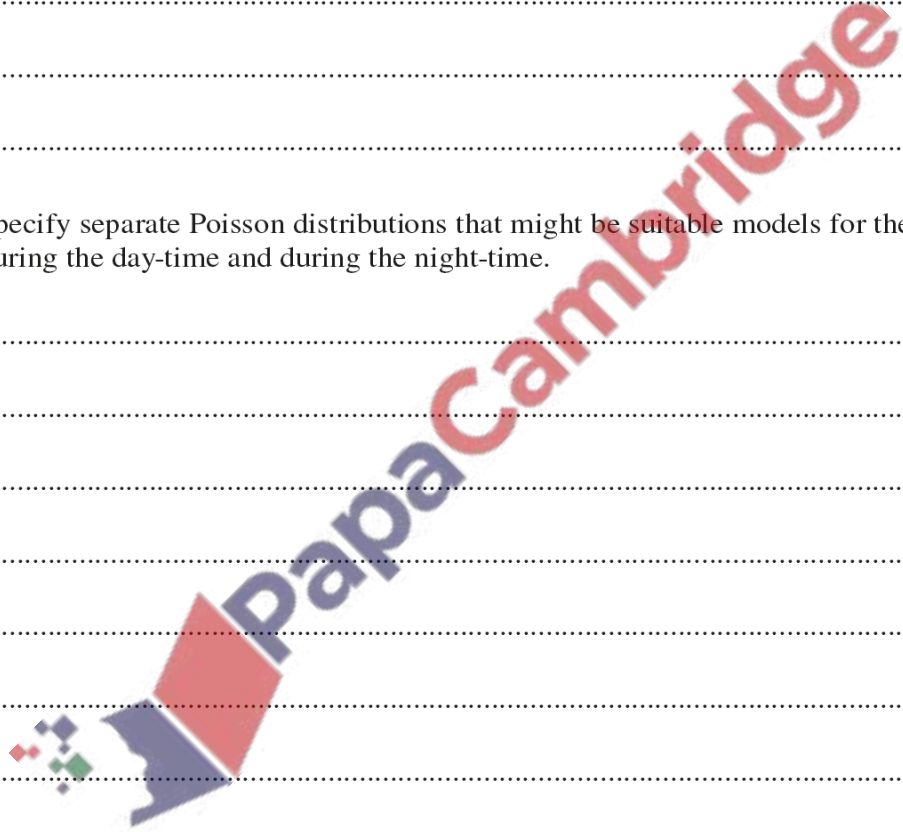
.....

.....

.....

.....

.....



(a) A random variable X has the distribution $Po(25)$.

Use the normal approximation to the Poisson distribution to find $P(X > 30)$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) A random variable Y has the distribution $B(100, p)$ where $p < 0.05$.

Use the Poisson approximation to the binomial distribution to write down an expression, in terms of p , for $P(Y < 3)$. [2]

.....

.....

.....

.....

.....

A random variable X has the distribution $Po(2.4)$.

- (a) Find $P(2 \leq X < 4)$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Two independent values of X are chosen.
Find the probability that both of these values are greater than 1. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

