

## Homework Assignment for Chapter 12 (Due by 3pm on Apr. 1)

Reference Exercise Problems: Text Book, 12.6 Exercises.

### Homework problems

**Problem 1** The number of customers that visit a bank on a day is modeled by a Poisson distribution. It is known that the probability of no customers at all is 0.0005. What is the expected number of customers?

**Problem 2** Let  $N$  have a  $Pois(6)$  distribution. What is  $P(N = 4)$ ?

**Problem 3** Let  $X$  have a  $Pois(2)$  distribution. What is  $P(X \leq 2)$ ?

**Problem 4** A certain brand of copper wire has flaws about every 20 centimeters. Model the locations of the flaws as a Poisson process. What is the probability of two flaws in 1 meter of wire?

**Problem 5** The Poisson model is sometimes used to study the flow of traffic. If the traffic can flow freely, it behaves like a Poisson process. A 20-minute time interval is divided into 10-second time slots. At a certain point along the highway the number of passing cars is registered for each 10-second time slot. Let  $n_j$  be the number of slots in which  $j$  cars have passed for  $j = 0, \dots, 9$ .

Suppose that one finds

$j$	0	1	2	3	4	5	6	7	8	9
$n_j$	3	38	28	20	7	3	4	0	0	1

Note that the total number of cars passing in these 20 minutes is 460.

- What would you choose for the intensity parameter  $\lambda$ ?
- Suppose one estimates the probability of 0 cars passing in a 10-second time slot by  $n_0$  divided by the total number of time slots. Does that (reasonably) agree with the value that follows from your answer in a?
- What would you take for the probability that 10 cars pass in a 10-second time slot?