Additional problems for exercises in Random phenomena course - 2nd set

1. A machine for attaching fabric to the floor attaches one clip in fifty poorly. For a product thirty clips are needed.

   (a) What is the probability that a product has three poorly attached clips? R: $P = 0.019$

   (b) What is the probability that the product will not have more than one poorly attached clip? R: $P = 0.880$

2. In Slovenia one in ten cars is contrary to the rule of the road. Twenty cars are examined.

   (a) What is the probability that among examined cars three are contrary to the rule of the road? R: $P = 0.323$

   (b) What is the number of cars which are contrary to the rule of the road with highest probability among twenty examined cars? What is the probability that we actually find that many cars? R: $x_0 = 2$ and $P = 0.285$

3. On the moving band products may or may not be correctly oriented. It is estimated that one in twenty is incorrectly oriented. How many products do we have to check so that with a probability of at least 0.95 at least one is incorrectly oriented? R: $n = 59$

4. A milk from 150 suppliers is examined on a daily basis. The probability that milk contains too many microorganisms is 0.006. What is the probability that there are at most three suppliers with inappropriate milk? R: $P = 0.9869$ in $P = 0.9865$

5. An Internet store monitors visits on its sides. It has been found out that the number of visits is Poisson distributed with an average frequency of 10 visits per hour.

   (a) What is the probability that in half an hour there will be at most three visits? R: $P = 0.265$

   (b) On average a purchase is made every five visits. What is the probability that in five hours at most five purchases will be made? R: $P = 0.067$

6. While examining tightness of the pipeline a special attention is paid to corrosion spots. It is known that the number of spots with corrosion is Poisson distributed. According to pipe's age on average three corrosion spots per 100 m of pipeline are expected.

   (a) How many meters of pipeline one has to examine so that at least one corrosion spot is found with probability of at least 0.9? R: $l = 76.75\,\mathrm{m}$

   (b) 10 m of pipeline is examined and tree corrosion spots are found. What is the probability for this to occur? What does this result tell us about the expectation on average number of corrosion spots? R: $P = 0.003$

7. At the factory of paper production it has been found out that on everage their paper has one defect per $10\,\mathrm{m}^2$.

   (a) What is the probability that on $50\,\mathrm{m}^2$ paper sheet there are at least three defects? R: $P = 0.875$

   (b) Paper is being rolled up to a $50\,\mathrm{m}^2$ bale. What is the probability that among five bales there is at most one with at least three defects? R: $P = 0.001$