Tutorial Sheet 4 - Named Discrete Distributions

Please prioritise the questions marked with an asterisk (*) and the multiple-choice questions. If time permits, feel free to attempt the remaining questions. I will be reviewing all questions during the tutorial.

Question 1 *

1. There are 30 candy covered chocolates in a bag M&M's. There is a .1 probability that the candy is red. If X is the number of red M&M's in the bag.

i. Give the binomial probability mass function for X.

ii. Find the probability of less than 2 red M&Ms in the bag.

Question 2

2. A baby wakes on average 0.25 times every hour.

i. If X is the number of times a baby wakes in an hour, give the Poisson probability mass function for X.

ii. If X is the number of times a baby wakes in eight hour, give the Poisson probability mass function for X.

iii. What is the probability that the baby does not wake during the 8 hours.

Question 3 *

3. Give the features of the following:

i. Geometric Experiment.

ii. Binomial Experiment.

iii. Poisson Experiment.

iv. Negative Binomial Experiment.

Question 4 *

4. Every day a production line makes 100 computers of which 10% are defective. If X is the number of defective computers in a day.

i. Give the binomial probability mass function for X.

ii. Find the probability that there is more than 2 computers defective in a day.

iii. What is the E[X] and Var[X] of the distribution?

Question 5 *

5. A phone center receives 15 calls every 30 minutes.

i. If X is the number of phone calls in 30 minutes, give the Poisson probability mass function for X.

ii. What is the probability that there will be exactly 10 phone calls in the first 30 minutes and exactly 20 phone calls in the second 30 minutes.

iii. What is the E[X] and Var[X] of the distribution.

Question 6

A basketball player has a 0.3 chance of making a free throw. They keep shooing until they get a basket.

i. Give the appropriate distribution for this situation.

ii. What is the probability they make their first shot on the third attempt?

iii. What is the E[X] and Var[X] of the distribution.

Question 7

A city installs a sensor at a traffic light that records the number of cars passing through every minute. On average, 3.3 cars pass through per minute.

i. Give the appropriate distribution for this situation.

ii. What is the probability that fewer than 2 cars pass through in a minute?

iii. What is the expected number of cars in a 10-minute interval?

Multiple-Choice Questions

MCQ Question 8

A multiple-choice quiz consists of ten questions each with five possible answers of which only one is correct. What is the appropriate probability distribution.

i. Geometric Distribution;

ii. Binomial Distribution;

iii. Poisson Distribution;

iv. Negative Binomial Distribution;

v. Gaussian Distribution.

MCQ Question 9

When a person fishing catches a fish, it is too small with a probability of 0.42 and it is returned to the water. On the other hand if it is bigger the person stops fishing.

i. Geometric Distribution;

ii. Binomial Distribution;

iii. Poisson Distribution;

iv. Negative Binomial Distribution;

v. Gaussian Distribution.

MCQ Question 10

The Poisson distribution is often used to model which of the following scenarios?

A) The number of events occurring within a fixed interval of time or space.

B) The number of successes in a fixed number of independent trials.

C) The number of trials required to get the first success.

D) The number of failures before the first success in a series of Bernoulli trials.

Question 11

Write your own question with a named discrete distribution.