Random Variable/Expected Value/PMF

Q1.

a) A Random variable X had the following probability function.

X	−2	−1	0	1	2
P(X)	0.2	K	0.4	2k	k

i) Find the value of K
ii) $\mathrm{E(X)}, \mathrm{E}(4\mathrm{X}+5), \mathrm{Var.}\,(X)$ and $\mathrm{Var}(4X+5)$

Q2.

From a lot of 10 times containing 3 defectives a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. Answer the following:

i. E (X)
ii. V (X)
iii. The probability distribution of X.

Q3.

An appliance dealer sells different models of freezers having 13.5, 15.9 and 19.1 cu.ft. of storage space purchased by the next customer to buy a freezer and p(x) be the p.m.f. given below as:

X;x	13.5	15.9	19.1
P(x)	0.2	0.5	0.3

i. Compute E(X) and V(X)

ii. If the price of a freezer having capacity x cubic feet is 25x - 8.5, what is the expected price paid by the next customer to buy a freezer?

iii. What is the variance of the price 25x - 8.5 paid by the next customer?

Q4.

Three bags contain 3 video cards and 2 network cards, 5 video cards and 6 network cards, 2 video cards and 4 network cards respectively.

One card is drawn from each urn. Find the expected number of video cards.

Binomial Distribution

Q1.

Harley Davidson, director of quality control for the Kyoto Motor company, is conducting his monthly spot check of automatic transmission. In this procedure, 10 transmissions are removed from the pool of components and are checked for manufacturing defects. Historically, only 2% of the transmissions have such flaws. (Assume that flaws occur independently in different transmission)

i. What is the probability that Harley's sample contains more than two transmissions with manufacturing flaws?
ii. What is the probability that none of the selected transmission has any manufacturing flaws?

Q2.

It is known that 5% of the screws manufactured by an automatic machine are defective. If a sample of 20 screw is selected at random, find the probability that the sample contains:

i. exactly two defective screws
ii. at least two defective screws.

Q3.

An experiment succeeds twice as often as it fails. Find the chance that in the next six trials there will be at least 4 successes. (Binomial distribution)

Q4.

Six dice are thrown 729 times. How many times do you expected at least three dice to shown a five or six?

Negative Binomial Distribution

Q1.

On the average how many time must a dice thrown until one get a 6?

Q2.

A marksman firing bullets at a target and probability of hitting the target at any trial is 0.7. Find probability that his seventh shot is his fourth hit.

Q3.

A coin is tossed until a head appears. What is expectation of number of tosses required?

Poisson Distribution

Q1.

The number of accident in a year attributed to taxi driver in a city is poisson distribution with mean 3.Out of 1000 taxi driver ,find approximately the number of taxi drivers with i)more than 3 accidents in a year) less than 2 accidents in a year.

Q2.

a) Messages arrive at an electronic message center at random times, with an average of 9 messages per hour.
   i. What is the probability of receiving at least five messages during the next hour?
   ii. What is the probability of receiving exactly five messages during the next hour?

Q3.

Customers arrive at complaint department of a store at the rate of 3 per hour. If arrivals follow a Poisson distribution calculate the probability that

i. No customer will arrive in a hour
ii. Two or three customers will arrive in an hour
iii. At least three customers will arrive in an hour