**Binomial Distribution**

1. In a Binomial Distribution consisting of 5 independent trials probability of 1 and two successes are 0.4096 and 0.2048 respectively find the parameter p of the distribution.

(1/5)

1. Out of 2000 families with 4 children each, how many would you expect to have (i) at least one boy (ii) two boys (iii) one or two girls and (iv) no girl. (1875, 750, 1250, 125)
2. A binomial variable 100 trials has 6 as its standard deviation this statement is (i) valid (ii) invalid (iii) cannot say. (Invalid)
3. For a Binomial Distribution the probability of a defective item is 1 by 10 .In a total of 400 items, find the mean and variance. (40, 36)
4. It is believed that 20% of the employees in an office are usually late if 10 employees report for duty on a given day what is the probability that (i) exactly 3 employees are late (ii) at most 3 employees are late (iii) at least three employees are late. (0.2, 0.88, 0.32)
5. In a sampling a large number of parts manufactured by a machine the mean number of defectives in a sample of 20 is 2 out of 1000 such samples how many would be expected to contain at least 3 defective parts. (323)
6. The probability that dropped from a plane will strike the target is 1 /5 if 6 bombs are dropped, find the probability that (i) exactly two will strike the target (ii) at least two will strike the target. (0.246, 0.345)
7. In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails.
8. An insurance salesman sells policies 25 man of identical age and good health according to the tables the probability that a man of this particular age will be alive 30 years hence is 2/3 find the probability that 30 years hence (i) at least one man will be alive (ii) at least three men will be alive. (242/243, 192/243)
9. A Binomial Distribution is fitted to set of observe data with total number of 200 observations if the mean and variance are 1.6 and 0.96 respectively calculate expected frequencies. (26, 69, 69, 31, 5)
10. In a multiple choice examination there are 20 questions. Each question has 4 alternative answers following it , and the student must select one correct answer. 4 marks are given for correct answer & 1 mark is deducted for wrong answer. A student must secure at least 50% of maximum possible marks to pass the examination. Suppose a student has not studied at all ,so that he answers the questions by guessing only. What is the probability that he will pass the examination? (0.00075)
11. An irregular six faced die is thrown and the probability that in 20 throws it will give 5 even numbers is twice the probability that it will give 5 odd numbers. How many times in 10,000 sets of 10 throws would you expect it to give no even number? (136.5)
12. Find the Mean of the probability distribution of the number of heads obtained in three

flips of a balanced coin.

1. If X is Binomial Distributed with *E(X)* = 2 & *Var(X) =4/3 ,* find the probability

distribution of X.

1. What is the expectation of heads if an unbiased coin is tossed 12 times?
2. If the probability of a defective bulb is 0.2 , find the mean & standard deviation for

the distribution of defective bulbs in a lot of 1000 bulbs. What is the expected number

of defective bulbs in the lot?

1. Find the binomial distribution if the mean is 4 & variance is 3.
2. The probability that a man aged 60 will live up to 70 is 0.65 , What is the probability

that out of 10 such men now at 60 at least 7 will live up to 70?

1. “In a binomial distribution the mean is 5 & SD is 3”. Find the fallacy if any in this

Statement.

1. What is the mean & variance of the binomial distribution .
2. With usual notation find *p* of Binomial distribution if *n = 6, 9P(X=4)=P(X=2) .*
3. A factory turns out an article by mass production methods. From the past experience it is found that 20 articles on an average are rejected out of every batch of 100.Find the mean & variance of the number of rejected articles.
4. The ratio of the probability of 3 successes in 5 independent trials to the probability of 2 successes in 5 independent trials is ¼. What is the probability of 4 successes in 6 independent trials?
5. 7 dice are thrown 729 times. How many times do you expect at least 4 dice to show 3 or 5 ?
6. In a multiple choice examination there are 20 questions. Each question has 4 alternative answers following it , and the student must select one correct answer. 4 marks are given for correct answer & 1 mark is deducted for wrong answer. A student must secure at least 50% of maximum possible marks to pass the examination. Suppose a student has not studied at all ,so that he answers the questions by guessing only. What is the probability that he will pass the examination?
7. An irregular six faced die is thrown and the probability that in 20 throws it will give 5 even numbers is twice the probability that it will give 5 odd numbers. How many times in 10,000 sets of 10 throws would you expect it to give no even number?
8. Out of 1000 families of 3 children each, how many would you expect to have 2 boys & 1 girl?
9. If hens of certain breed lay eggs on 5 days a week on an average, find on how many days during a season of 100 days, a poultry keeper with 5 hens of this breed, will expect to receive at least 4 eggs?
10. Let *X,Y* be two independent binomial variates with parameters respectively. Evaluate P(*X+Y=3*) , P(*X+Y>=3*) .
11. Let *X,Y* be two independent binomial variates with parameters respectively. Evaluate P(*X+Y>=1*) .
12. Three fair coins are tossed 3000 times. Find the frequencies of the distribution of heads and tails and tabulate the result. Also calculate the mean & standard deviation of the distribution.
13. A biased coin is tossed 5 times and the whole experiment is repeated 200 times. The following frequencies of 0,1,2 … heads were obtained.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. of heads | 0 | 1 | 2 | 3 | 4 | 5 | Total |
| Frequency | 12 | 56 | 44 | 69 | 18 | 1 | 200 |

Fit a Binomial distribution and find the theoretical frequencies. Also find the mean and variance of the filled distribution.

1. Determine the probability of getting 9 exactly twice in 3 throws with a pair of fair dice.
2. Out of 800 families with 5 children each, how many would expect to have a) 3 boys

b) 5 girls c) either 2 or 3 boys. Assume equal probabilities for boys & girls.

1. Determine the probability distribution of the number of bad eggs in a box of 6 chosen at random if 10% of eggs are bad, in large consignment.
2. Assume that 50% of all engineering students are good in mathematics. Determine the probabilities that among 18 engineering students a) exactly 10 , b) at least 10,
3. c) at most 8 , d) at least 2 & at most 9, are good in maths.
4. If X be a binomially distributed random variable with E(X) = 2 & Var(X) = 4/3, find the distribution of X.
5. Fit a Binomial distribution and find the theoretical frequencies.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 |
| *f* | 30 | 62 | 46 | 10 | 2 |

1. Ten coins are thrown simultaneously. Find the probability of getting at least seven heads.
2. A & B are play a game in which their chance of winning are in the ratio 3: 2 .Find A’s chance of winning at least three games out of the five games played.
3. A multiple-choice test consists of 8 questions with 3 answers to each question(of which only one is correct). A student answers each question by rolling a balanced die and checking the first answer if he gets 1 or 2, the second answer if gets 3 or 4, and the third answer if he gets 5 or 6 .To get a distinction , the student must secure at least 75% correct answers. If there is no negative marking , what is the probability that the student secures a distinction?
4. The probability of a man hitting a target is ¼. i) If he fires 7 times what is the probability of his hitting the target at least twice? ii) How many times must he fires so that the probability of his hitting the target at least once is greater than 2/3 ?
5. In a binomial distribution consisting of 5 independent trials , probabilities of 1 or 2 successes are 0.4096 & 0.2048 respectively. Find the parameter ‘***p***’ of the distribution.
6. The following data are the number of seeds germinating out of 10 on damp filter paper for 80 sets of seeds. Fit a binomial distribution to the following data:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *f* | 6 | 20 | 28 | 12 | 8 | 6 | 0 | 0 | 0 | 0 | 0 |

Compare the theoretical frequencies with the actual ones. Also find the mean and variance of the fitted distribution.

1. Seven coins are tossed and the no. of heads obtained is noted. The experiment is repeated 128 times and the following distribution is obtained

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. of heads: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total |
| Frequency: | 7 | 6 | 19 | 35 | 30 | 23 | 7 | 1 | 128 |

Fit a Binomial distribution if (i) the coins are unbiased, (ii) if the nature of the coins is not known.