Example – 6

1. 100 random digits between 0 and 9 are selected from a table with the frequencies shown below.

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	11	8	8	7	8	9	12	9	13	15

Could the digits be from a random number table? Test at the 5% significance level.

2. The data in the table are thought to be modeled by a binomial distribution with n=10 and p=0.2. Use the table for the binomial cumulative distribution function to find expected values, and conduct a test to see if this is a good model. Use a 5% significance level.

x	0	1	2	3	4	5	6	7	8
Frequency of x	12	28	28	17	7	4	2	2	0

3. A study of the number of girls in families with 5 children was done on 100 such families. The results are summarized in the following table.

No. of girls, r	0	1	2	3	4	5
Frequency, f	13	18	38	20	10	1

It is suggested that the distribution may be modeled by a Binomial Distribution.

a) Give reasons why this might be so.

b) Test to see if the Binomial distribution is a good model.

4. The numbers of telephone calls arriving at and exchange in 6-minutes periods were recorded over a period of 8 hours, with the following results.

Number of calls, r	0	1	2	3	4	5	6	7	8
Frequency, f_r	8	19	26	13	7	5	1	1	0

Can the result be modeled by a Poisson distribution?

5. During observations on the height of 200 male students the following data were observed.

Height (cm)	150-154	155-159	160-164	165-169	170-174	175-179	180-184	185-189	190-194
Frequency	4	6	12	30	64	52	18	10	4

a) Test at the 5% level of significance to see if the height of male students could be modeled by a normal distribution with mean 172 and standard deviation 6.

b) Describe how you would modify this test if the mean and variance were unknown.

6. In a study on the habits of a flock of starlings, the direction in which they headed when they left their roost in the mornings was recorded over 240 days. The direction was found by recording if they headed between certain features of the landscape. The compass bearings of these features were then measured. The results are given below.

Direction (degrees)	0-	58-	100-	127-	190-	256-	296-360
Frequency	31	40	47	40	32	30	20

It is suggested that the starlings feed equally in all directions. Suggest a suitable model and test to see if these data support this view.

7. During the trial of a new drug, 60 volunteers out of 200 were treated with the drug. Those experiencing a relief of their symptoms and those who did not were recorded as follows:

	Relief	No relief	Totals
Treated	10	50	60
Not treated	40	100	140
Totals	50	150	200

Use a suitable test to see if there is any association between treatment with the drug and relief of systems.