



Probability & Statistics

Assignment

1. The manager of a commercial mortgage department of a large bank has collected data during the past two years concerning the number of commercial mortgages approved per week. The results from these two years (104 weeks) indicated the following:

NUMBER OF COMMERCIAL	MORTGAGES APPROVED FREQUENCY
0	13
1	25
2	32
3	17
4	9
5	6
6	1
7	1
	104

Does the distribution of commercial mortgages approved per week follow a Poisson distribution? (Use the 0.01 level of significance.)

2. The College of Dentistry at the University of Florida has made a commitment to develop its entire curriculum around the use of self-paced instructional materials such as videotapes, slide tapes, and syllabi. It is hoped that each student will proceed at a pace commensurate with his or her ability and that the instructional staff will have more free time for personal consultation in student–faculty interaction. One such instructional module was developed and tested on the first 50 students proceeding through the curriculum. The following measurements represent the number of hours it took these students to complete the required modular material.

16 8 33 21 34 17 12 14 27 6
 33 25 16 7 15 18 25 29 19 27
 5 12 29 22 14 25 21 17 9 4
 12 15 13 11 6 9 26 5 16 5
 9 11 5 4 5 23 21 10 17 15

- Calculate the mode, the median, and the mean for these recorded completion times.
- Compute the value of s .
- Would you expect the Empirical Rule to describe adequately the variability of these data? Explain.

3. A manufacturer of cases for sound equipment requires drilling holes for metal screws. The drill bits wear out and must be replaced; there is expense not only in the cost of the bits but also for lost production. Engineers varied the rotation speed of the drill and measured the lifetime y (thousands of holes drilled) of four bits at each of five speeds x . The data were:

x	60	60	60	60	80	80	80	80	100	100	100	100	120	120	120	120	140	140	140	140
y	4.6	3.8	4.9	4.5	4.7	5.8	5.5	5.4	5.0	4.5	3.2	4.8	4.1	4.5	4.0	3.8	3.6	3.0	3.5	3.4

- Create a scatter plot of the data. Does there appear to be a relation? Does it appear to be linear?
- Is there any evident outlier? If so, does it have high influence?
- Postulate a regression model for these data mentioning carefully what assumptions are made on the random errors.
- Fit the model by estimating the parameters and plot the fitted line on the diagram.
- Give a 90% confidence interval for the 'slope' parameter after first testing the hypothesis of no linear association.

4. An airline offers only two choices for dinner on all its flights: chicken or beef. Past experience has shown that 60% of its passengers will ask for chicken. For a flight with 500 passengers, the airline orders 315 chicken dinners and 210 beef dinners. Find the probability that not everyone will get the dinner choice they asked for.
 [Hint: This is the same as the probability that the number of passengers who ask for chicken is greater than 315 or less than $500 - 210 = 290$. Use the normal approximation.]