Table 7.4

Number of Heads (X)	$\Pr\{X \text{ heads}\}$	Expected Frequency	Observed Frequency
0	0.0332	33.2, or 33	38
1	0.1619	161.9, or 162	144
2	0.3162	316.2, or 316	342
3	0.3087	308.7, or 309	287
4	0.1507	150.7, or 151	164
5	0.0294	29.4, or 29	25

7.32 Use the Kolmogorov–Smirnov test in MINITAB to test the data in Table 7.5 for normality. The data represent the time spent on a cell phone per week for 30 college students.

Table 7.5

16	17	15
14	14	16
12	16	12
13	11	14
10	15	14
13	15	16
17	13	15
14	18	14
11	12	13
13	15	12

SOLUTION

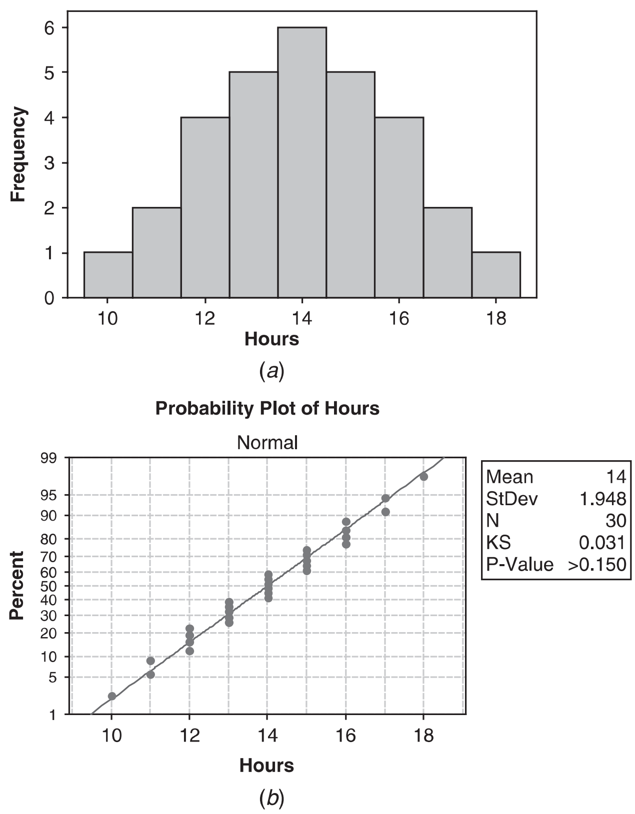


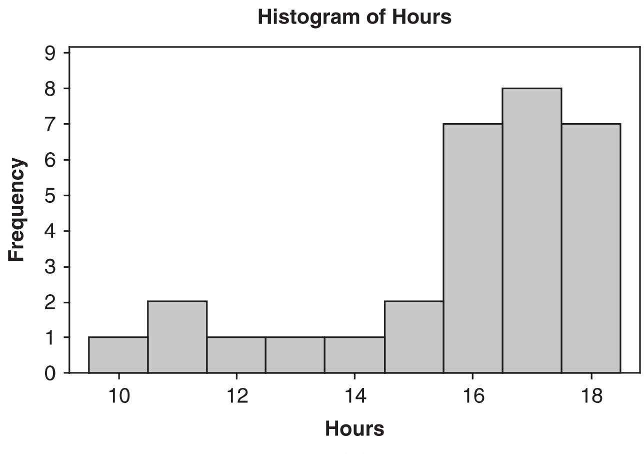
Fig. 7-15 Kolmogorov–Smirnov test for normality: normal data. (*a*) Histogram reveals a set of data that is normally distributed; (*b*) Kolmogorov–Smirnov test of normality indicates normality p-value>0.150.

The histogram in Fig. 7-15(*a*) indicates that the data in this survey are normally distributed. The Kolmogorov–Smirnov test also indicates that the sample data came from a population that is normally distributed. Most statisticians recommend that if the p-value is less than 0.05, then reject normality. The p-value here is > 0.15.

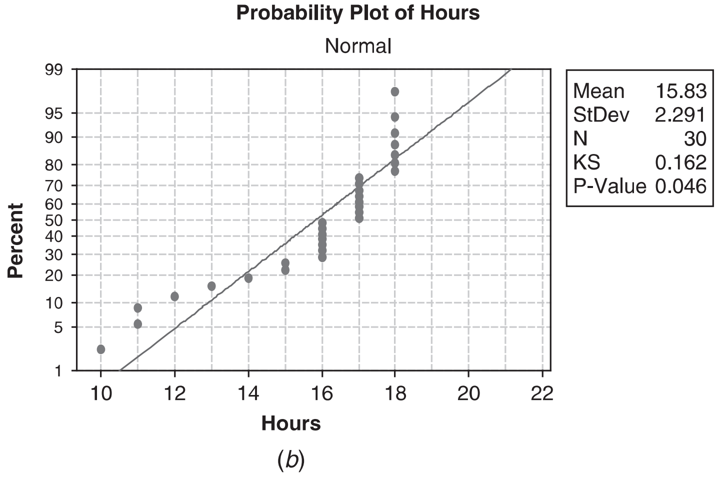
7.33 Use the Kolmogorov–Smirnov test in MINITAB to test the data in Table 7.6 for normality. The data represent the time spent on a cell phone per week for 30 college students.

Table 7.6

18	16	11
17	12	13
17	17	17
16	18	17
16	17	17
16	18	15
18	18	16
16	16	17
14	18	15
11	18	10



(*a*)



(*b*)

Fig. 7-16 Kolmogorov–Smirnov test for normality: non-normal data p-value $= 0.046$. (*a*) Histogram reveals a set of data that is skewed to the left; (*b*) Kolmogorov–Smirnov test of normality indicates lack of normality.

Most statisticians recommend that if the p-value is less than 0.05, then reject normality. The p-value here is less than 0.05.

7.34 Table 7.7 shows the number of days, f, in a 50-day period during which X automobile accidents occurred in a city. Fit a Poisson distribution to the data.

Table 7.7

Number of Accidents (X)	Number of Days (f)
0	21
1	18
2	7
3	3
4	1
	Total 50

SOLUTION

The mean number of accidents is

$$\lambda = \frac{\sum fX}{\sum f} = \frac{(21)(0) + (18)(1) + (7)(2) + (3)(3) + (1)(4)}{50} = \frac{45}{50} = 0.90$$

Thus, according to the Poisson distribution,

$$\Pr\{X \text{ accidents}\} = \frac{(0.90)^X e^{-0.90}}{X!}$$

Table 7.8 lists the probabilities for 0, 1, 2, 3, and 4 accidents as obtained from this Poisson distribution, as well as the expected or theoretical number of days during which X accidents take place (obtained by multiplying the respective probabilities by 50). For convenience of comparison, column 4 repeats the actual number of days from Table 7.7.

Note that the fit of the Poisson distribution to the given data is good.

Table 7.8

Number of Accidents (X)	$\Pr\{X \text{ accidents}\}$	Expected Number of Days	Actual Number of Days
0	0.4066	20.33, or 20	21
1	0.3659	18.30, or 18	18
2	0.1647	8.24, or 8	7
3	0.0494	2.47, or 2	3
4	0.0111	0.56, or 1	1

For a true Poisson distribution, the variance $\sigma^2 = \lambda$. Computing the variance of the given distribution gives 0.97. This compares favorably with the value 0.90 for λ, and this can be taken as further evidence for the suitability of the Poisson distribution in approximating the sample data.