F	Sa	W	M	Tu	F	Th	M
Tu	F	Tu	F	Su	W	Th	F
Th	W	Th	Sa	W	W	F	F
Tu	Su	Tu	Th	W	Sa	Tu	Th
F	W	F	F	Su	F	Th	Tu
F	Tu	Tu	Tu	Sa	W	W	Sa
F	Sa	Th	W	F	Th	F	M
F	M	F	Su	W	Th	M	Tu
Sa	Th	F	Su	W			

M 𝍸 5

Tu 𝍸 𝍸 | 11

W 𝍸 𝍸 || 12

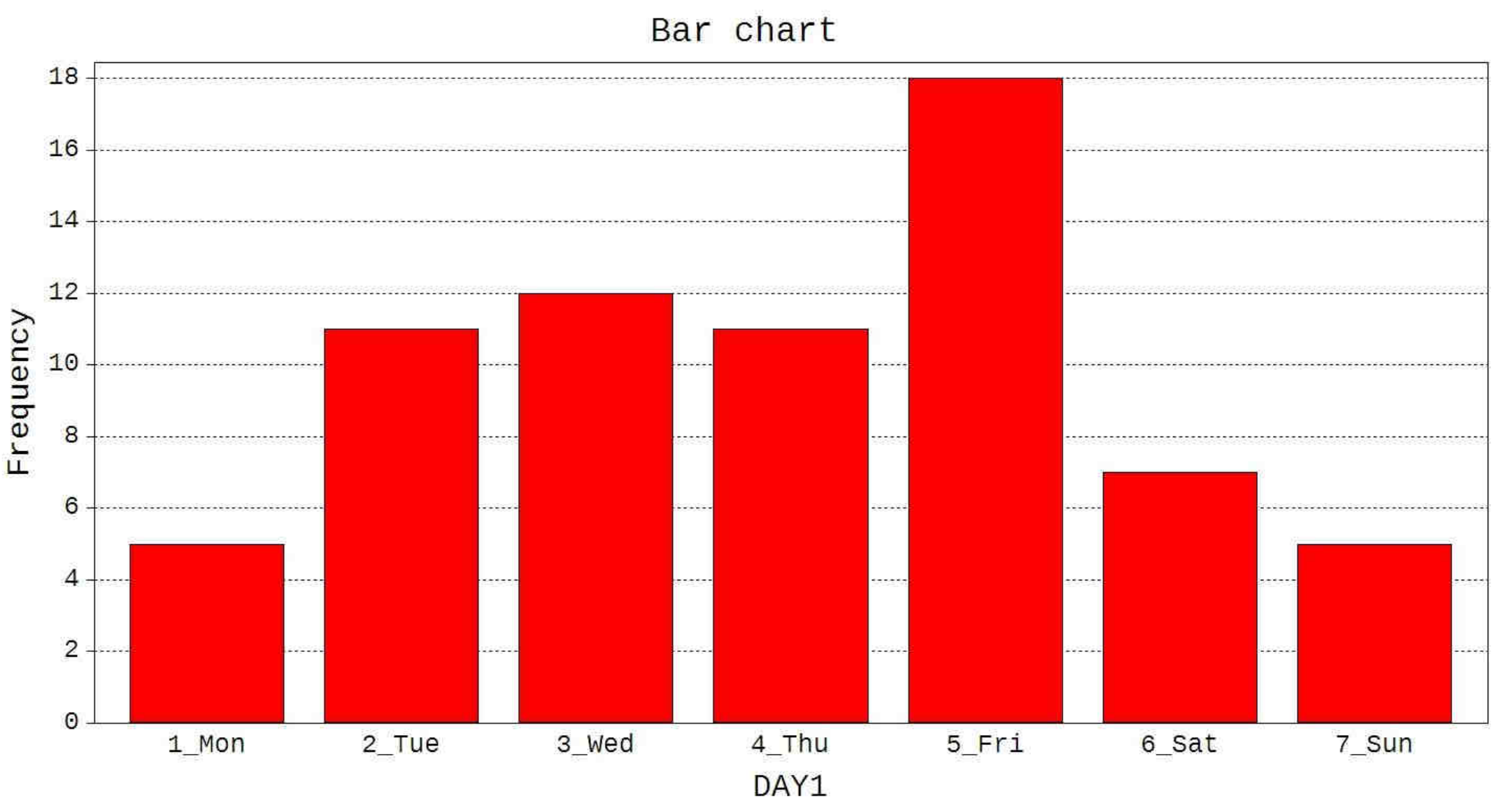
Th 𝍸 𝍸 | 11

F 𝍸 𝍸 𝍸 ||| 18

Sa 𝍸 || 7

Su 𝍸 5

69


Bar chart
Frequency
18
16
14
12
10
8
6
4
2
0
1_Mon
2_Tue
3_Wed
4_Thu
5_Fri
6_Sat
7_Sun
DAY1

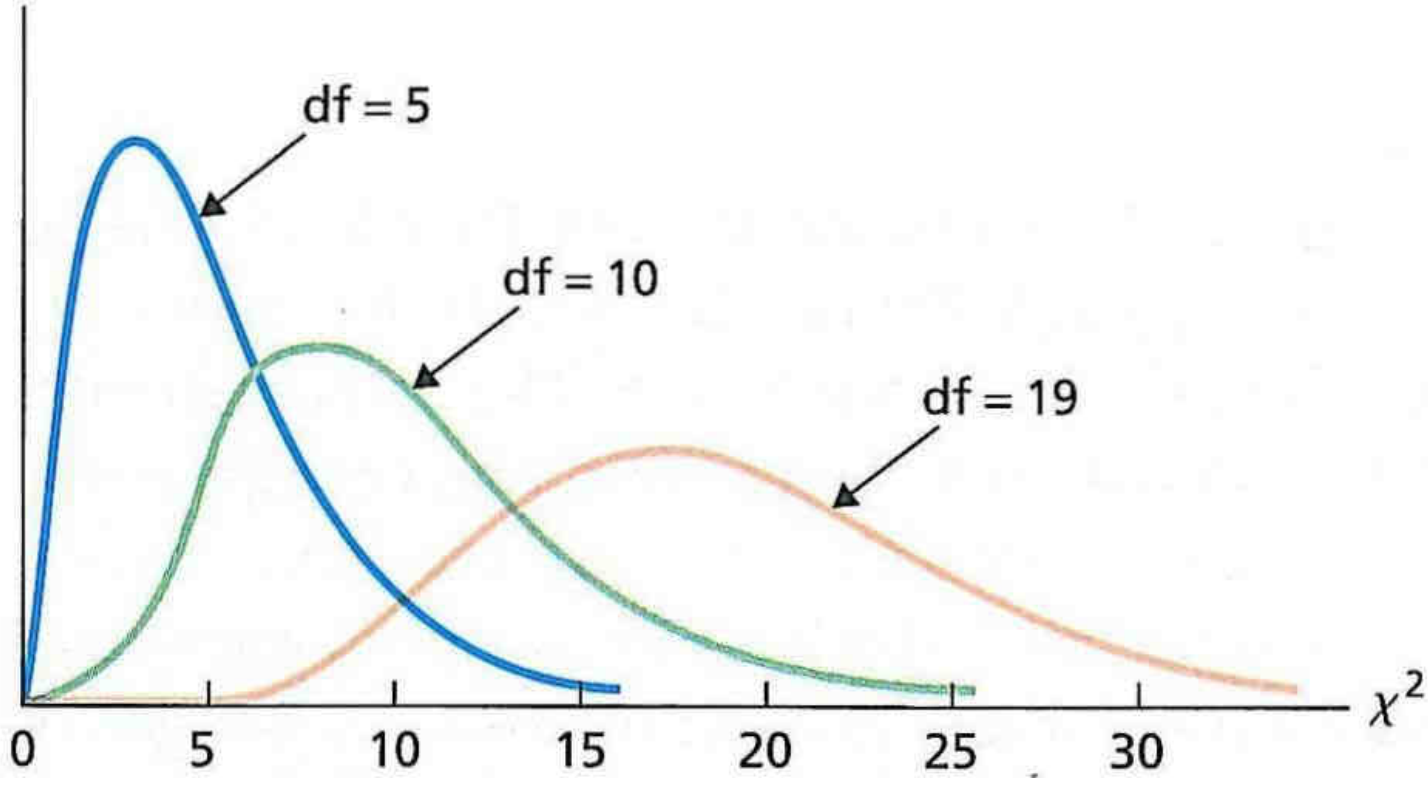
E: $69/7 = 9.857$

$\chi^2 = 13.073$ $df = 6$

$p = 0,04189$

CASE	OBS	EXP	OBS_EXP	CHI2
1	5	9.857	2.3932686	13.072653
2	11	9.857	0.1325402	M
3	12	9.857	0.4659074	M
4	11	9.857	0.1325402	M
5	18	9.857	6.7270416	M
6	7	9.857	0.8280865	M
7	5	9.857	2.3932686	M

FIGURE 12.1
χ^2-curves for df = 5, 10, and 19



Basic Properties of χ^2-Curves

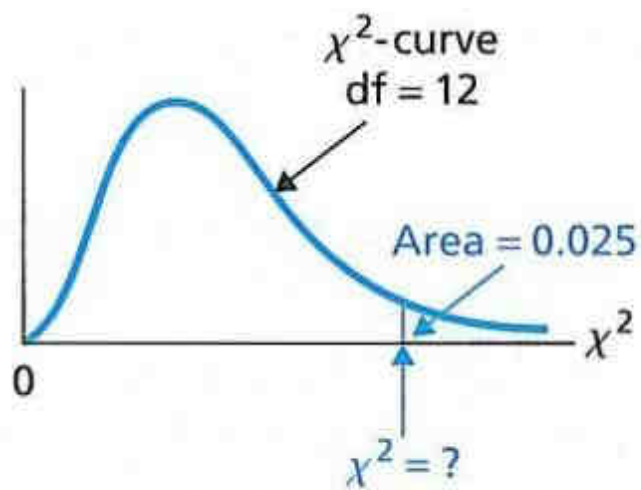
Property 1: The total area under a χ^2-curve equals 1.

Property 2: A χ^2-curve starts at 0 on the horizontal axis and extends indefinitely to the right, approaching, but never touching, the horizontal axis.

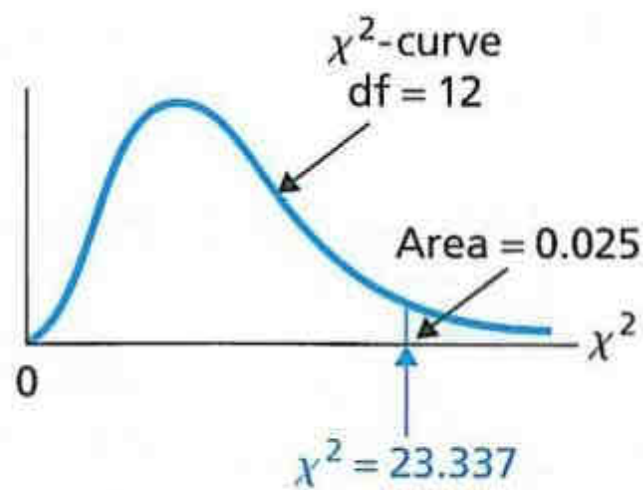
Property 3: A χ^2-curve is right skewed.

Property 4: As the number of degrees of freedom becomes larger, χ^2-curves look increasingly like normal curves.

FIGURE 12.2
Finding the χ^2-value that has area 0.025 to its right



(a)



(b)

Distribution of the χ^2-Statistic for a Chi-Square Goodness-of-Fit Test

For a chi-square goodness-of-fit test, the test statistic

$$\chi^2 = \Sigma(O - E)^2/E$$

has approximately a chi-square distribution if the null hypothesis is true. The number of degrees of freedom is 1 less than the number of possible values for the variable under consideration.

The Chi-Square Goodness-of-Fit Test (Critical-Value Approach)

Assumptions

1. All expected frequencies are 1 or greater.
2. At most 20% of the expected frequencies are less than 5.

Step 1 **The null and alternative hypotheses are**

H_0: The variable under consideration has the specified distribution.

H_a: The variable under consideration does not have the specified distribution.

Step 2 Calculate the expected frequency for each possible value of the variable under consideration by using the formula $E = np$, where n is the sample size and p is the relative frequency (or probability) given for the value in the null hypothesis.

Step 3 Determine whether the expected frequencies satisfy Assumptions 1 and 2. If they do not, this procedure should not be used.

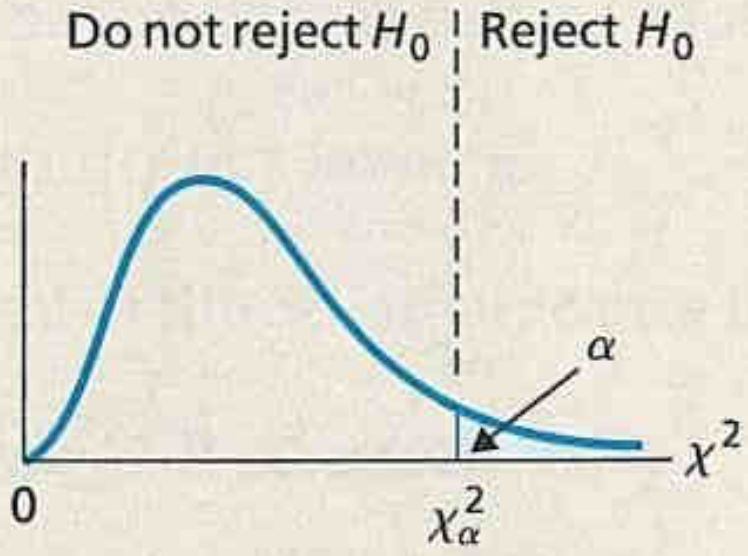
Step 4 Decide on the significance level, α.

Step 5 Compute the value of the test statistic

$$\chi^2 = \Sigma(O - E)^2 / E,$$

where O and E denote observed and expected frequencies, respectively.

Step 6 The critical value is χ^2_α with df $= k - 1$, where k is the number of possible values for the variable under consideration. Use Table V to find the critical value.



Step 7 If the value of the test statistic falls in the rejection region, reject H_0; otherwise, do not reject H_0.

Step 8 Interpret the results of the hypothesis test.

The Chi-Square Goodness-of-Fit Test (*P*-Value Approach)

Assumptions

1. All expected frequencies are 1 or greater.
2. At most 20% of the expected frequencies are less than 5.

Step 1 **The null and alternative hypotheses are**

H_0: **The variable under consideration has the specified distribution.**

H_a: **The variable under consideration does not have the specified distribution.**

Step 2 Calculate the expected frequency for each possible value of the variable under consideration by using the formula $E = np$, where n is the sample size and p is the relative frequency (or probability) given for the value in the null hypothesis.

Step 3 Determine whether the expected frequencies satisfy Assumptions 1 and 2. If they do not, this procedure should not be used.

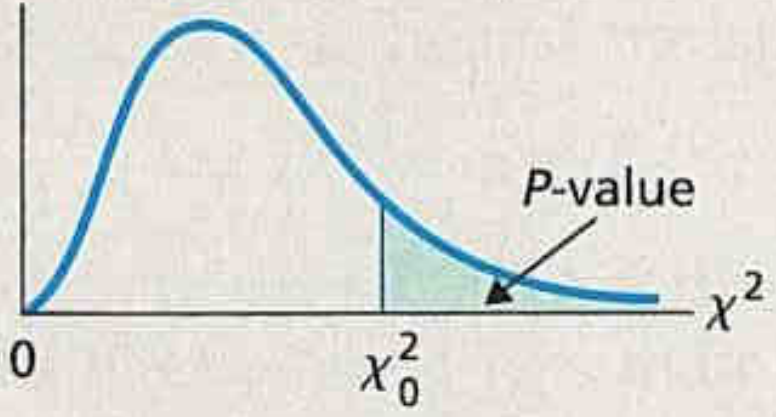
Step 4 Decide on the significance level, α.

Step 5 Compute the value of the test statistic

$$\chi^2 = \Sigma(O-E)^2/E$$

and denote it χ_0^2. Here O and E denote observed and expected frequencies, respectively.

Step 6 The χ^2-statistic has df $= k - 1$, where k is the number of possible values for the variable under consideration. Use Table V to estimate the P-value, or obtain it exactly by using technology.



Step 7 If $P \leq \alpha$, reject H_0; otherwise, do not reject H_0.

Step 8 Interpret the results of the hypothesis test.