

```

1 *****;
2 *** Two varieties of a particular moth species occur in two ***;
3 *** colors (brown and white). A biologist in North Carolina ***;
4 *** wants to know if the distribution of the two varieties ***;
5 *** differs with the area of the state. He collects ***;
6 *** individuals from each region of the state and note the ***;
7 *** number of each variety. ***;
8 *****;
9 dm'log;clear;output;clear';
10 OPTIONS LS=99 PS=512 nocenter nodate nonumber;
11
12 ODS HTML style=minimal rs=none
13 body='C:\EXST 7005\SAS\Example03.html' ;
NOTE: Writing HTML Body file: C:\EXST 7005\SAS\Example03.html
14 ODS RTF style=minimal rs=none
15 body='C:\EXST 7005\SAS\Example03.rtf' ;
NOTE: Writing RTF Body file: C:\EXST 7005\SAS\Example03.rtf
16 ODS PDF style=minimal body='C:\EXST 7005\SAS\Example03.PDF';
NOTE: Writing ODS PDF output to DISK destination
"C:\EXST 7005\SAS\Example03.PDF", printer "PDF".
17
18 TITLE1 'Introductory SAS example 3';
19
20 options nocenter ps=256 ls=99 nodate nonumber nolabel;
21 title1 'Examples of Chi square tests';
22 title2 'Chi square test of independence';
23 data one;
24 input color $ area $ number;
25 cards;
NOTE: The data set WORK.ONE has 6 observations and 3 variables.
NOTE: DATA statement used (Total process time):
real time 0.01 seconds
cpu time 0.01 seconds
25 ! run;
32 ;
33 proc print; title3 'Data listing';
34 run;
NOTE: There were 6 observations read from the data set WORK.ONE.
NOTE: The PROCEDURE PRINT printed page 1.
NOTE: PROCEDURE PRINT used (Total process time):
real time 0.17 seconds
cpu time 0.00 seconds

```

Examples of Chi square tests

Chi square test of independence

Data listing

Obs	color	area	number
1	White	west	92
2	White	central	12
3	White	east	37
4	Brown	west	8
5	Brown	central	4
6	Brown	east	18

```
36      proc freq; title3 'Proc Freq without weight statement';
37      tables color*area;
38      run;
```

NOTE: There were 6 observations read from the data set WORK.ONE.

NOTE: The PROCEDURE FREQ printed page 2.

NOTE: PROCEDURE FREQ used (Total process time):

```
real time      0.14 seconds
cpu time       0.03 seconds
```

Examples of Chi square tests
 Chi square test of independence
 Proc Freq without weight statement

The FREQ Procedure

Table of color by area

color	area			
Frequency				
Percent				
Row Pct				
Col Pct	central	east	west	Total
Brown	1	1	1	3
	16.67	16.67	16.67	50.00
	33.33	33.33	33.33	
	50.00	50.00	50.00	
White	1	1	1	3
	16.67	16.67	16.67	50.00
	33.33	33.33	33.33	
	50.00	50.00	50.00	
Total	2	2	2	6
	33.33	33.33	33.33	100.00

```
39
40      proc freq; title3 'Chi square analysis using Proc Freq';
41      weight number;
42      tables color*area / chisq expected cellchi2 norow nocol nopercnt;
43      run;
```

NOTE: There were 6 observations read from the data set WORK.ONE.

NOTE: The PROCEDURE FREQ printed page 3.

NOTE: PROCEDURE FREQ used (Total process time):

```
real time      0.28 seconds
cpu time       0.00 seconds
```

Examples of Chi square tests
 Chi square test of independence
 Chi square analysis using Proc Freq
 The FREQ Procedure

Table of color by area

color Frequency Expected Cell Chi-Square	area			Total
	central	east	west	
Brown	4 2.807 0.507	18 9.6491 7.2273	8 17.544 5.1919	30
White	12 13.193 0.1079	37 45.351 1.5377	92 82.456 1.1047	141
Total	16	55	100	171

Statistics for Table of color by area

Statistic	DF	Value	Prob
Chi-Square	2	15.6764	0.0004
Likelihood Ratio Chi-Square	2	15.5329	0.0004
Mantel-Haenszel Chi-Square	1	10.6004	0.0011
Phi Coefficient		0.3028	
Contingency Coefficient		0.2898	
Cramer's V		0.3028	

Sample Size = 171

```

44
45 *****;
46 *** Testing for a Mendalian ration of 9 : 6 : 1 in a breeding experiment ***;
47 *****;
48 options nocenter ps=60 ls=78 nodate nonumber;
49 title1 'Examples of Chi square tests';
50 title2 'Chi square goodness of fit test';
51
52 data GoodFit;
53 input color $ number;
54 cards;
NOTE: The data set WORK.GOODFIT has 3 observations and 2 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
54      !           run;
58      ;
59      proc print data=GoodFit; title3 'Raw Data listing';
60      run;
NOTE: There were 3 observations read from the data set WORK.GOODFIT.
NOTE: The PROCEDURE PRINT printed page 4.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.26 seconds
      cpu time            0.00 seconds
    
```

Examples of Chi square tests

Chi square goodness of fit test

Raw Data listing

Obs	color	number
1	red	153
2	pink	72
3	white	17

```

61
62     proc freq data=GoodFit order=data; weight number;
63         title3 'Chi square analysis using Proc Freq';
64         tables color / chisq nocum testp=(0.5625 0.3750 0.0625);
65     run;

```

NOTE: There were 3 observations read from the data set WORK.GOODFIT.

NOTE: The PROCEDURE FREQ printed page 5.

NOTE: PROCEDURE FREQ used (Total process time):

real time	0.12 seconds
cpu time	0.03 seconds

Examples of Chi square tests

Chi square goodness of fit test

Chi square analysis using Proc Freq

The FREQ Procedure

color	Frequency	Percent	Test Percent
red	153	63.22	56.25
pink	72	29.75	37.50
white	17	7.02	6.25

Chi-Square Test
for Specified Proportions

Chi-Square	6.1983
DF	2
Pr > ChiSq	0.0451

Sample Size = 242

```

67 *****;
68 *** A sample of fishes from North Carolina swamp streams ***;
69 *** revealed 47 male Flier sunfish and 59 females. Test the ***;
70 *** hypothesis that the population contains equal numbers of ***;
71 *** males and females ***;
72 *****;
73 options nocenter ps=60 ls=78 nodate nonumber;
74 title1 'Examples of Chi square tests';
75 title2 'Chi square of equal proportions';
76
77 data EqualP;
78 input sex $ number;
79 cards;

```

NOTE: The data set WORK.EQUALP has 2 observations and 2 variables.

NOTE: DATA statement used (Total process time):

```

real time          0.01 seconds
cpu time           0.01 seconds

```

```

79 ! run;
82 ;
83 proc print data=EqualP; title3 'Raw Data listing';
84 run;

```

NOTE: There were 2 observations read from the data set WORK.EQUALP.

NOTE: The PROCEDURE PRINT printed page 6.

NOTE: PROCEDURE PRINT used (Total process time):

```

real time          0.04 seconds
cpu time           0.00 seconds

```

Examples of Chi square tests

Chi square of equal proportions

Raw Data listing

Obs	sex	number
1	Female	59
2	Male	47

```

85
86 proc freq data=EqualP; weight number;
87 title3 'Chi square analysis using Proc Freq';
88 tables sex / chisq expected cellchi2 binomial;
89 run;

```

NOTE: There were 2 observations read from the data set WORK.EQUALP.

NOTE: The PROCEDURE FREQ printed page 7.

NOTE: PROCEDURE FREQ used (Total process time):

```

real time          0.17 seconds
cpu time           0.04 seconds

```

Examples of Chi square tests
 Chi square of equal proportions
 Chi square analysis using Proc Freq

The FREQ Procedure

sex	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Female	59	55.66	59	55.66
Male	47	44.34	106	100.00

Chi-Square Test
 for Equal Proportions

 Chi-Square 1.3585
 DF 1
 Pr > ChiSq 0.2438

Binomial Proportion
 for sex = Female

 Proportion 0.5566
 ASE 0.0483
 95% Lower Conf Limit 0.4620
 95% Upper Conf Limit 0.6512

Exact Conf Limits
 95% Lower Conf Limit 0.4569
 95% Upper Conf Limit 0.6531

Test of H0: Proportion = 0.5

ASE under H0 0.0486
 Z 1.1655
 One-sided Pr > Z 0.1219
 Two-sided Pr > |Z| 0.2438

Sample Size = 106

```

90
91     ods html close;
92     ods rtf close;
93     ods PDF close;
NOTE: ODS PDF printed 7 pages to C:\EXST
      7005\SAS\Example03.PDF.
94
95     run;
96     quit;
97
```