TABLE 3.14 SAS Output for Problem 3.13

```
        Fisher's Exact Test
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Cell (1,1) Frequency (F)      21
Left-sided Pr <= F        0.8947
Right-sided Pr >= F       0.3808
Table Probability (P)     0.2755
Two-sided Pr <= P         0.6384
--------------------------------

Odds Ratio                2.1000

Asymptotic Conf Limits:
    95% Lower Conf Limit  0.3116
    95% Upper Conf Limit 14.1523
Exact Conf Limits:
    95% Lower Conf Limit  0.2089
    95% Upper Conf Limit 27.5522
```

indicates whether the cancer was controlled for at least two years following treatment. Table 3.14 shows SAS output.

a. Report and interpret the P-value for Fisher's exact test with **(i)** H_a: $\theta > 1$, and **(ii)** H_a: $\theta \neq 1$. Explain how the P-values are calculated.

b. Interpret the confidence intervals for θ. Explain the difference between them and how they were calculated.

c. Find and interpret the one-sided mid-P-value. Give advantages and disadvantages of this type of P-value.

3.14 A study considered the effect of prednisolone on severe hypercalcaemia in women with metastatic breast cancer (B. Kristensen et al., *J. Intern. Med.* **232**: 237–245, 1992). Of 30 patients, 15 were randomly selected to receive prednisolone. The other 15 formed a control group. Normalization in their level of serum-ionized calcium was achieved by 7 of the treated patients and none of the control group. Analyze whether results were significantly better for treatment than for control. Interpret. Use one-sided Fisher exact test with significance level 0.05

3.15 For Problem 3.14, obtain a 95% confidence interval for the odds ratio using **(a)** the Woolf (i.e., Wald) interval, **(b)** Cornfield's "exact" approach, **(c)** the profile likelihood. In each case, note the effect of the zero cell count. Summarize advantages and disadvantages of each approach.

3.16 Refer to the tea-tasting data (Table 3.8). Construct the null distributions of the ordinary P-value and the mid-P-value for Fisher's exact test with H_a: $\theta > 1$. Find and compare their expected values.

3.2 Refer to Table 2.5 on lung cancer and smoking. Construct a confidence interval for a relevant measure of association. Interpret.

3.3 In professional basketball games during 1980–1982, when Larry Bird of the Boston Celtics shot a pair of free throws, 5 times he missed both, 251 times he made both, 34 times he made only the first, and 48 times he made only the second (Wardrop 1995). Is it plausible that the successive free throws are independent?

3.4 Refer to Table 3.10.

a. Using X^2 and G^2, test the hypothesis of independence between party identification and race. Report the P-values and interpret.

b. Use residuals to describe the evidence of association.

c. Partition chi-squared into components regarding the choice between Democrat and Independent and between these two combined and Republican. Interpret.

d. Summarize association by constructing a 95% confidence interval for the odds ratio between race and whether a Democrat or Republican. Interpret.

TABLE 3.10 Data for Problem 3.4

	Party Identification		
Race	Democrat	Independent	Republican
Black	103	15	11
White	341	105	405

Source: 1991 General Social Survey, National Opinion Research Center.

3.5 Refer to Table 3.10. In the same survey, gender was cross-classified with party identification. Table 3.11 shows some results. Explain how to interpret all the results on this printout.

3.6 In a study of the relationship between stage of breast cancer at diagnosis (local or advanced) and a woman's living arrangement, of 144 women living alone, 41.0% had an advanced case; of 209 living with spouse, 52.2% were advanced; of 89 living with others, 59.6% were advanced. The authors reported the P-value for the relationship as 0.02 (D. J. Moritz and W. A. Satariano, *J. Clin. Epidemiol.* **46**: 443–454, 1993). Reconstruct the analysis performed to obtain this P-value.