11. *Choosing How to Present Statistical Results*

SOLUTIONS

1. For the estimated coefficient on female gender among students with combined SATs in the lowest 15%

    a. The t-statistic $= 6.985$ ($=$ coefficient/standard error $= 0.262/0.038$).
    b. The 95% confidence interval is 0.188, 0.336 ($= 0.262 \pm [1.96 \times 0.038]$).
    c. The 99% confidence interval is 0.165, 0.359 ($= 0.262 \pm [2.56 \times 0.038]$).
    d. $p < 0.001$ based on the t-statistic of 6.99 and criteria for a large sample.
    e. ** would accompany the "female" coefficient.

3. Answer these questions using the information in table 11A (Zimmerman 2003).

    a. There is one model for each of three subsamples of combined own SAT score: students in the bottom 15% of the Williams College SAT range, those in the middle 70%, and those in the top 15%. This information is presented in the column spanner ("Student's own combined math & verbal SAT score") and column headers.
    b. The coefficient for "female" is statistically significantly higher in the bottom 15% of SAT scores (0.262, s.e. $= 0.038$) than for the other two groups ($\beta = 0.103$, s.e. $= 0.016$, and $\beta = 0.107$, s.e. $= 0.028$ for the middle 70% and top 15% of SAT scores, respectively). The difference between the lower and middle groups, for example, is calculated $0.262 - 0.103 = 0.159$. The corresponding standard error of the difference $= \sqrt{(0.038)^2 + (0.016)^2} = 0.041$. Dividing the difference between coefficients by the standard error of the difference, we obtain 0.159/0.041, or a t-statistic of 3.86, which exceeds 2.56, the critical value of the test statistic for $p < 0.01$ for a sample of this size. However, the difference between the female coefficients for the upper two SAT groups is not statistically significant because the difference ($-0.004 = 0.103 - 0.017$) is swamped by the standard error of the difference.
    c. No additional information is needed to conduct a formal statistical test of this difference. The estimates and their standard errors are

independent of one another because they are from separate (stratified) models. Hence we do not need to take the covariances into account, as would be necessary with interaction terms between gender and SAT group estimated within one model that pooled all SAT groups.

5. Consider real household income as reflected in table 11B.1.

   a. Yes, the change in real household income between 1998 and 1999 for all households is statistically significant at $p < 0.10$. The upper 90% CL for 1998 median income for all households (\$40,131) is below the lower 90% CL for the corresponding figure for 1999 (\$40,502). Hence the 90% confidence intervals for the respective years do not overlap, so the increase in median income from \$39,744 to \$40,816 is significant at $p < 0.10$. Because the estimates for the two years are independent, the covariance between estimates does not need to be taken into account when performing the test.
   b. Yes, the change in real household income between 1998 and 1999 for family households is statistically significant at $p < 0.10$. The upper 90% CL for 1998 median income for family households (\$48,936) is below the lower 90% CL for the corresponding figure for 1999 (\$49,491). Same logic as for part a.
   c. No, the change in real household income between 1998 and 1999 for nonfamily households is not statistically significant. The upper 90% CL for 1998 median income for nonfamily households (\$24,436) is above the lower 90% CL for the corresponding figure for 1999 (\$24,122). Hence the 90% confidence intervals for the two estimates overlap, and we cannot conclude that they are statistically significantly different at $p < 0.10$.

7. The multiplier (critical value) for $p < 0.10$ and a large sample size is 1.64, so we divide the reported ± values from the 90% CI by 1.64 to

TABLE 11B.2. Median income (constant 1999 \$) with 95% CI, by type of household, United States, 1998 and 1999

	1998				1999			
Type of household	Median income	Standard error	Lower 95% CL	Upper 95% CL	Median income	Standard error	Lower 95% CL	Upper 95% CL
Family households	48,517	255	48,016	49,018	49,940	274	49,403	50,477
Married-couple families	55,475	330	54,828	56,122	56,827	306	56,227	57,427
Female householder, no husband present	24,932	408	24,132	25,732	26,164	362	25,454	26,874
Male household, no wife present	40,284	1,018	38,288	42,280	41,838	799	40,271	43,405
Nonfamily households	23,959	291	23,389	24,529	24,566	271	24,035	25,097
Female householder	19,026	288	18,462	19,590	19,917	277	19,374	20,460
Male householder	31,086	349	30,402	31,770	30,753	346	30,074	31,432
All households	39,744	236	39,281	40,207	40,816	191	40,441	41,191

obtain the standard error (s.e.) of each estimate. Then calculate the 95% CL as estimate $\pm$ (1.96 $\times$ s.e.), as shown in table 11B.2.

9. For the estimated coefficient on "ever-married,"

   a. The test statistic is the chi-square (χ^2) = (β_k/s.e.$_k$)^2 = $(-0.09/0.06)^2$ = 2.25.
   b. $p < 0.10$.
   c. The 95% confidence interval for the coefficient (e.g., the 95% CI around the log-odds point estimate) = –0.208, 0.028 = $-0.09 \pm (1.96 \times 0.06)$.