**12.48** In the following regression, *X* = weekly pay, *Y* = income tax withheld, and *n* = 35 McDonald’s

employees. (a) Write the fitted regression equation. (b) State the degrees of freedom for a two tailed

test for zero slope, and use Appendix D to find the critical value at *α* = .05. (c) What is your

conclusion about the slope? (d) Interpret the 95 percent confidence limits for the slope. (e) Verify

that *F* = *t*2 for the slope. (f) In your own words, describe the fit of this regression.

R2 0.202

Std. Error 6.816

n 35

ANOVA table

*Source SS df MS F p-value*

Regression 387.6959 1 387 .6959 8.35 .0068

Residual 1,533 .0614 33 46 .4564

Total 1,920 .7573 34

Regression output *confidence interval*

*variables coefficients std. error t (df* = *33) p-value 95% lower 95% upper*

Intercept 30.7963 6.4078 4.806 .0000 17.7595 43.8331

Slope 0.0343 0.0119 2.889 .0068 0.0101 0.0584

**12.50** In the following regression, *X* = total assets ($ billions), *Y* = total revenue ($ billions), and *n* = 64 large banks. (a) Write the fitted regression equation. (b) State the degrees of freedom for a twotailed test for zero slope, and use Appendix D to find the critical value at *α* = .05. (c) What is your conclusion about the slope? (d) Interpret the 95 percent confidence limits for the slope. (e) Verify that *F* = *t*2 for the slope. (f) In your own words, describe the fit of this regression.

R2 0.519

Std. Error 6.977

n 64

ANOVA table

*Source SS df MS F p-value*

Regression 3,260.0981 1 3,260.0981 66.97 1.90E-11

Residual 3,018.3339 62 48.6828

Total 6,278.4320 63

Regression output *confidence interval*

*variables coefficients std. error t (df* = *62) p-value 95% lower 95% upper*

Intercept 6.5763 1.9254 3.416 .0011 2.7275 10.4252

X1 0.0452 0.0055 8.183 1.90E-11 0.0342

**13.30** A researcher used stepwise regression to create regression models to predict *BirthRate* (births per 1,000) using five predictors: *LifeExp* (life expectancy in years), *InfMort* (infant mortality rate), *Density* (population density per square kilometer), *GDPCap* (Gross Domestic Product per capita), and *Literate* (literacy percent). Interpret these results. **BirthRates2**

Regression Analysis—Stepwise Selection (best model of each size)

153 observations

BirthRate is the dependent variable

*p-values for the coefficients*

Nvar LifeExp InfMort Density GDPCap Literate s Adj R2 R2

1 .0000 6.318 .722 .724

2 .0000 .0000 5.334 .802 .805

3 .0000 .0242 .0000 5.261 .807 .811

4 .5764 .0000 .0311 .0000 5.273 .806 .812

5 .5937 .0000 .6289 .0440 .0000 5.287 .805 .812

**13.32** An expert witness in a case of alleged racial discrimination in a state university school of nursing introduced a regression of the determinants of *Salary* of each professor for each year during an 8-year period (*n* = 423) with the following results, with dependent variable *Year* (year in which the salary was observed) and predictors *YearHire* (year when the individual was hired), *Race* (1 if individual is black, 0 otherwise), and *Rank* (1 if individual is an assistant professor, 0 otherwise). Interpret these results.

*Variable Coefficient t p*

*Intercept* −3,816,521 −29.4 .000

*Year* 1,948 29.8 .000

*YearHire* −826 −5.5 .000

*Race* −2,093 −4.3 .000

*Rank* −6,438 −22.3 .000

*R*2 = 0.811 *R*2adj= 0.809 *s* = 3,318

**14.16** (a) Plot the data on U.S. general aviation shipments. (b) Describe the pattern and discuss possible

causes. (c) Would a fitted trend be helpful? Explain. (d) Make a similar graph for 1992–2003 only.

Would a fitted trend be helpful in making a prediction for 2004? (e) Fit a trend model of your

choice to the 1992–2003 data. (f) Make a forecast for 2004, using either the fitted trend model or

a judgment forecast. Why is it best to ignore earlier years in this data set? **Airplanes**

**U.S. Manufactured General Aviation Shipments, 1966–2003**

*Year Planes Year Planes Year Planes Year Planes*

1966 15,587 1976 15,451 1986 1,495 1996 1,053

1967 13,484 1977 16,904 1987 1,085 1997 1,482

1968 13,556 1978 17,811 1988 1,143 1998 2,115

1969 12,407 1979 17,048 1989 1,535 1999 2,421

1970 7,277 1980 11,877 1990 1,134 2000 2,714

1971 7,346 1981 9,457 1991 1,021 2001 2,538

1972 9,774 1982 4,266 1992 856 2002 2,169

1973 13,646 1983 2,691 1993 870 2003 2,090

1974 14,166 1984 2,431 1994 881

1975 14,056 1985 2,029 1995 1,028