# SPSS Chapter 10 Example 1 – Inference for Regression (continued)

The SPSS output for this example of the Linear Regression is the following:

Variable Entered/Removed

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | Heart rate[a] | . | Enter |

a. All requested variables entered
b. Dependent Variable: oxygen uptake

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .969[a] | .938 | .935 | .12046 |

a. Predictors: (Constant), heart rate

The $R^2$ value indicates that 93.8% of the variance in "oxygen uptake" is explained by changes in the variable "heart rate."

ANOVA[b]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 3.762 | 1 | 3.762 | 259.266 | .000[a] |
| | Residual | .247 | 17 | 1.451E-02 | | |
| | Total | 4.009 | 18 | | | |

a. Predictors: (Constant), heart rate
b. Dependent Variable: oxygen uptake

The ANOVA table indicates the regression is statistically significant ($F(1,17) = 259.266$, $p<.0001$). The F-test tests the $H_0$: $\beta_1=0$ vs $H_a$: $\beta_1\neq0$. Clearly there is strong evidence against $H_0$.

Coefficients[a]

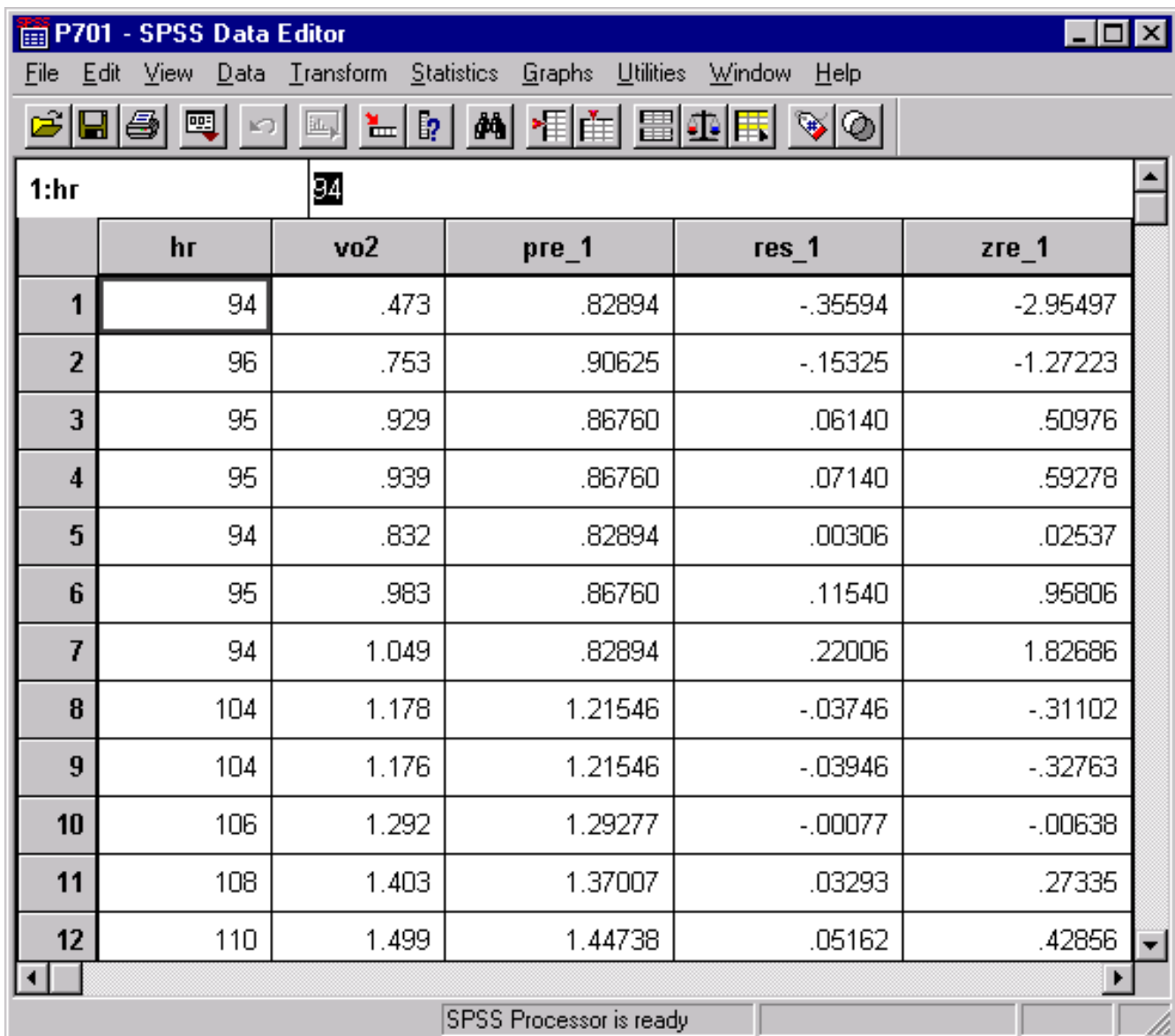| Model | | Unstandardized Coefficients B | Std. Error | Standardized Coefficients Beta | t | Sig. | 95% Confidence Interval for B Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|---|
| 1 | (Constant) | -2.804 | .258 | | -10.855 | .000 | -3.349 | -2.259 |
| | heart rate | 3.865E-02 | .002 | .969 | 16.102 | .000 | .034 | .044 |

a. Dependent Variable: oxygen uptake

The equation for the model using the least squares criterion is y=-2.804 + .003865x. The test of $H_0$: $\beta_1=0$ vs $H_a$: $\beta_1 \neq 0$ is a t-test (t=16.102 with 17 degrees of freedom). The p-value is <.0001, and therefore we have strong evidence against $H_0$. Heart rate influences oxygen uptake. A 95% Confidence Interval for the slope is (.034, .044).

Residual Statistics[a]

|  | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 8.2894 | 2.25907 | 1.33142 | .45716 | 19 |
| Residual | -.35594 | .22006 | 9.93E-17 | .11706 | 19 |
| Std. Predicted Value | -1.099 | 2.029 | .000 | 1.000 | 19 |
| Std. Residual | -2.955 | 1.827 | .000 | .972 | 19 |

a. Dependent Variable: oxygen uptake

The residuals are saved as variables in the SPSS Data Editor window.



| | P701 - SPSS Data Editor | | | | |
|---|---|---|---|---|---|
| File Edit View Data Transform Statistics Graphs Utilities Window Help | | | | | |
| 1:hr | 94 | | | | |
| | hr | vo2 | pre_1 | res_1 | zre_1 |
| 1 | 94 | .473 | .82894 | -.35594 | -2.95497 |
| 2 | 96 | .753 | .90625 | -.15325 | -1.27223 |
| 3 | 95 | .929 | .86760 | .06140 | .50976 |
| 4 | 95 | .939 | .86760 | .07140 | .59278 |
| 5 | 94 | .832 | .82894 | .00306 | .02537 |
| 6 | 95 | .983 | .86760 | .11540 | .95806 |
| 7 | 94 | 1.049 | .82894 | .22006 | 1.82686 |
| 8 | 104 | 1.178 | 1.21546 | -.03746 | -.31102 |
| 9 | 104 | 1.176 | 1.21546 | -.03946 | -.32763 |
| 10 | 106 | 1.292 | 1.29277 | -.00077 | -.00638 |
| 11 | 108 | 1.403 | 1.37007 | .03293 | .27335 |
| 12 | 110 | 1.499 | 1.44738 | .05162 | .42856 |

SPSS Processor is ready