<u>SPSS Chapter 2 Example 1 – Fitting a Line to Data (continued)</u>

After creating a scatterplot of the data, the head of the math department may wish to perform a regression analysis of the data. The data are the same as the example of the scatterplot.

Follow these steps to perform a regression analysis:

7. Click **Analyze**, click **Regression**, and click **Linear**. The following window will appear.

📲 Linear Regression			×
 # first year students (fir # enrolled in elementar 	F	Dependent:	K. ste
	Pre <u>v</u> ious	Block 1 of 1 Next Be	set
		Independent(s):	ncel
	\mathbf{F}	He	elp
		Method: Enter	
		S <u>e</u> lection Variable:	
	\mathbf{F}	R <u>u</u> le	
		Case Labels:	
WLS >>	<u>S</u> tatistics	Plots Save Options	

8. Click "**firstyr**" (a.k.a. "**# first year students**") and click ▲ to move "**firstyr**" into the box entitled *Independent*(*s*).

- 9. Click "enroll" (a.k.a. "# enrolled in elementary math") and click ▲ to move "enroll" into the box entitled *Dependent*.
- 10.To calculate additional statistics, click the button entitled **Statistics** and the following window will appear.

Linear Regression: Statis	tics	×
Regression Coefficients Estimates Confidence intervals Covariance matrix	 Model fit R squared change Descriptives Part and partial correlations Collinearity diagnostics 	Continue Cancel Help
Residuals		٦
Durbin-Watson		
Casewise diagnostics		
Outliers outside	3 standard deviations	

- 11.The default conditions for this window are Estimates (in the box entitled *Regression Coefficients*) and Model Fit. Click Casewise diagnostics so that a checkmark (✓) appears in the box before Casewise diagnostics. The default condition for this *Residuals* feature is to display all outliers outside of three standard deviations.
- 12.If you want to perform any other statistical calculations for this example, just check (✓) them. Now click **Continue**.

13.Click the **Save** button and the following window will appear.

Linear Regression: Save		×
Predicted Values Unstandardized Standardized Adjusted S.E. of mean predictions Distances Mahalanobis Cook's Leverage values Prediction Intervals Mean Individual Confidence Interval: Save to New File Coefficient statistics	Residuals Unstandardized Standardized Studentized Deleted Studentized deleted Influence Statistics DfBeta(s) Standardized DfBeta(s) DfEit Standardized DfFit Covariance ratio	Continue Cancel Help

- 14.Click **Unstandardized** and **Standardized** in the box entitled *Residuals*. Click **Unstandardized** in the box entitled *Predicted Values*. Click **Continue**.
- 15.Click OK.

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

Variables Entered/Removed [®]
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Model	Variables	Variables	Method
	Entered	Removed	
1	# first year students ^a		Enter

a. All requested variables entered

b. Dependent Variable: # enrolled in elementary math

Model Summary^b

Madal	C		Adjusted R	Std. Error of the
IVIODEI	R	R Square	Square	Estimate
1	.833 ^a	.694	.643	188.95

a. Predictors: (Constant), # first year students

b. Dependent Variable: # enrolled in elementary math

The correlation is r = .833. The R^2 statistic above indicates that 69.4% of the variance in y ("response variable") is explained by changes in x ("explanatory variable").

ANOVA^b

Mode		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	486552.229	1	486552.229	13.628	.010 ^a
	Residual	214209.271	6	35701.545		
	Total	700761.500	7			

a. Predictors: (Constant), # first year students

b. Dependent Variable: # enrolled in elementary math

We will discuss the ANOVA table in chapter 10.

Coefficients^a

Unstanda		Unstandard	dized	Standardized		
		Coefficients		Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	2492.692	1267.199		1.967	.097
	# first year students	1.066	.289	.833	3.692	.010

a. Dependent Variable: # enrolled in elementary math

The least square equation for the model is found in the *Unstandardized Coefficient* table under the *B* column. It is y = 2492.692 + 1.066x.

Residual Statistics^a

				Std.	
	Minimum	Maximum	Mean	Deviation	Ν
Predicted Value	6752.65	7639.83	7164.25	263.64	8
Residual	-180.65	317.74	-3.41E-13	174.93	8
Std. Predicted Value	-1.561	1.804	.000	1.000	8
Std. Residual	956	1.682	.000	.926	8

a. Dependent Variable: # enrolled in elementary math

The Residuals are saved in the SPSS Data Editor:

📺 P15	58 - SPSS Data	Editor				- 🗆	×
<u>F</u> ile <u>E</u>	<u>File Edit View Data Transform Statistics Graphs Utilities Window H</u> elp						
2	1 🕘 🔍 🖂) 🗐 🔚 🖡	M 📲 🛅 🗮	₫ <u>,</u> 1			
1:first	tyr	4595					
	firstyr	enroll	res_1	zre_1	var		
1	4595	7364	-28.44298	15053			
2	4827	7547	-92.82977	49130			
3	4427	7099	-114.30083	60493			
4	4258	6894	-139.09235	73614			
5	3995	6572	-180.64957	95608			
6	4330	7156	46.13244	.24415			
7	4265	7232	191.44339	1.01320			
8	4351	7450	317.73967	1.68162			-
						►	
			SPSS Processor is read	ly 🖉			11.