Directions for using SPSS

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Accessing SPSS

To connect to SPSS (either from Washburn's computer labs or your home computer that is connected to the internet) use the following procedure:

- 1. Run Remote Desktop Connection. (It is usually found under Start> Programs> Accessories> Communications > Remote Desktop Connection).
- 2. When the program asks you what computer to connect to type **wustat.washburn.edu** and click **Connect**.

🔁 Remote I		
9	Remote Desktop Connection	
<u>C</u> omputer:	wustat.washburn.edu	•
	Connect Cancel	Help Options >>

- 3. When the computer asks for your **User Name** and **Password**, use the one that you use in order to log onto the computers at Washburn University.
- 4. After entering your User Name and Password click on the **OK** button.

Log On to Wir	Idows
Copyright © 1985-	Microsoft Windows Server 2003 Enterprise Edition
User name:	zzjdoe
Password:	<u> </u>
Log on to:	WUAD
	OK Cancel Shut Down Options <<

5. The WUStat Desktop will overly your existing desktop – including a new "Start" menu (see below). Note the unusual "bar" at the top with a "Minimize" (-) and "Close" (x) buttons. Pressing the minimize or pressing the <Alt><Tab> Keys will return you to your own Desktop. The "WUstat" Desktop is "minimized" to the taskbar. You can end the session by logging off.

	wuapps.washbum.edu	- 8 ×	/
<u>}</u>		8	
	reasons and he found under the start means of Charts All Dreamans & CDCC for b		

- The SPSS program can be found under the start menu at Start> All Programs > SPSS for Windows> SPSS 17.0 for Windows.
- 7. When SPSS starts, you can then open an existing dataset or start a new one.

Transferring Files to n:\drive or Your Computer

- 1. Download Core FTP Light software from http://www.coreftp.com/download.html
- 2. Install the software and run the program
- 3. Select File> Connect.
- 4. Set-up the Washburn Connection as shown below except change the Host to **sftp.washburn.edu** and use your **Username** and **Password** that you use to log-on to Washburn computers.

Site Manager	×
Washbum	Site Name
	Washbum
	Host / IP / URL sftp.washbum.edu Username zzwalker Password
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	Port Timeout Retries 22 60 2 <u>R</u> etry 0n
	☑ <u>P</u> ASV □ <u>U</u> se Proxy
	Connection
	SSH/SFTP -
- Comments	- SSL Options
	SSL Listings 🔽 SSL Transfer 🗖 Clear (CCC)
New Site New Category	Connect Connect Manager Close

- 5. Select the **Connect** button.
- 6. The browser will appear as below. Make sure your directory is **/home/Username/**.
- Your computer and their files are on the left hand side directory. Washburn's n:\drive is on the right hand side directory. You can transfer files from your home computer to Washburn's computer and vice versa.
- 8. Select the file that you wish to transfer and hit the **arrow** button in the center of the screen to send the file to either your computer or WUAD (n:\ drive).

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		Permissions		

Importing Data from another File Format

- 1. Make sure that the file you are attempting to access is saved on WUAD (N: drive).
- 2. In SPSS select, File> Open> Data.
- 3. Browse for the file that you wish to import into SPSS. Make sure that you changed the "**Files of type**" section at the bottom of the dialog, to the type of file that you wish to open, as illustrated below. (The program automatically looks only for SPSS files).
- 4. Click on the file you wish to import.
- 5. Select Open.

Open Data					? ×
Look jn:	🗁 Overtime Gam	es	•	G 🕫 🖻 🕻	.
My Recent Documents Desktop My Documents My Computer	Data & Output	j.xls edictions.xls			
My Network Places	File <u>n</u> ame:	Post Season Predictions	.xls	•	<u>O</u> pen
	Files of <u>type</u> :	Excel (*.xls)		_	Cancel

- 6. Make sure you check the box for **reading variable names from the first column** if the file has labels in the first column of data.
- 7. If you are importing a Microsoft Excel file that only has one sheet, then skip to step 9.
- 8. Select the worksheet and range.
- 9. Click **OK**.

Opening Excel Data Source 🛛 🔀									
N:\My Documents\Research\0vertime Games\Post Season Predictions.xls									
Read variable names from the first row of data.									
Worksheet: Sheet2 [A1:M37]									
Range:									
Maximum width for string columns: 32767									
OK Cancel Help									

Exporting Output to Use in Word or Other Programs

- 1. You can export your statistical output to a number of formats that are useful for presenting your data. The available formats are Microsoft Excel, Microsoft Word, Html (for the Web), a Text file, Microsoft PowerPoint, or Portable Document Format (pdf).
- 2. Once you have completed your statistical analysis, select File> Export.
- 3. You will bring up the Export Output dialog box shown below.
- 4. In the **Export Format** box select the file type that you wish to save the output as.
- 5. In the **Export File** box select the **Browse** button.

Export Outpu	t		×
<u>E</u> xport:	Output Document	•	Options Chart <u>S</u> ize
Export File	N:\Output.xls		<u>B</u> rowse
Export Wha	t	Export Format	
🖲 <u>А</u> II ОБј	ects	File <u>T</u> ype:	
⊂ All <u>V</u> isi	ble Objects	Excel file (*.xls)	•
C Select	ed Objects		
[OK Ca	ncel Help	

- 6. You will bring up the dialog box shown below. Name the file and save it in your WUAD drive (N: drive).
- 7. Click on Save.

Save As		? ×
Save in:	🗝 zzwalker on 'wustore\Home' (N:) 💿 🗿 🤌 📴 🚥	
My Recent Documents Desktop My Documents My Computer	 .dt Download Files mail My Documents web 	
My Network Places	File <u>n</u> ame:	<u>S</u> ave
	Save as type: Excel file (*.xls)	Cancel

8. You will now be back to the dialog box from step 3. Click **OK**.

Typing data directly in SPSS

- 1. In SPSS select, File>New>Data
- 2. Click on the Variable View tab (at the bottom of the screen).
- 3. Type in the variable names in the *Name* column, the type of data (numeric, date, string, ...) in the *Type* column. As shown below.

Silo Edit	*Untitled1 [DataSet0] - SPSS Data Editor										
		Iransform Analy	yze <u>G</u> raph	rs <u>O</u> diides <u>wi</u> n T∽l ⊞latal∎		1					
	Name	Type	Width	Decimals		J Values	Missing	Columns	Alian	Measure	
1	V	Numeric	8	2		None	None	8	Right	Scale	4
2	x1	Numeric	8	2		None	None	8	Right	Scale	-
3	x2	Numeric	8	2		None	None	8	Right	Scale	-
4			-					-			-
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31											
\ Dar	ta View }Var	iable View /			_)
	SPSS Processor is ready										

- 4. Once you have labeled your variables, click on the **Data View** tab.
- 5. Type in your data for each variable. An example is shown below.

🔛 *Untit	🚼 *Untitled1 [DataSet0] - SPSS Data Editor												
<u>Eile E</u> dit	Eile Edit View Data Iransform Analyze Graphs Utilities Window Help												
3 : x2	: x2 3 Visible: 3 of 3 Variable												ariable
	у	x1	x2	var	var	var	var	var	var	var	var	var	
1	1.00	1.00	4.00										
2	2.00	1.00	1.00										
3	3.00	1.00	3.00										
4	4.00	1.00	4.00										
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6	6.00	4.00	5.00										
7													- 1
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	l Ita View 🖌 ∨s	ariable View 🖊			1	1	•	-		+	1	-	+ T }
		(2	SPSS Processor	is ready							-

6. Save your file by selecting: **File>Save.**

- 7. Give your file a name that you will remember and save it to your WUADD account (N: drive).
- 8. Make sure that the file you are attempting to save is saved on WUAD (N: drive).

Save Data As						? ×
Savejn:	😰 zzwalker on 'w	vustore\Home' (N:)	• 0	1 🕫 🖻	•	
My Recent Documents Desktop My Documents My Computer	i .dt Download Files mail My Documents web					
My Network		Keeping 3 of 3 variables.				⊻ariables
Flaces	File <u>n</u> ame:	Data		•		<u>S</u> ave
	Save as type:	SPSS (*.sav)		-		<u>P</u> aste
	<u>N</u>	/rite variable names to spreads	heet			Cancel
	🗖 S	ave value labels where define	d instead of	data value	s	
	Г S	av <u>e</u> value labels into a .sas file				1.

Creating Dummy Variables from Categorical Data

These directions will help with creating data that can be used in regression analysis from categorical data.

Suppose for example, gender is one of your variables and the data was keyed in as "M" or "F". As the dataset below shows.

ΩU	ntitled1	[Data	Set0] - S	PSS Statis	tics Data	Editor				
Eile	<u>E</u> dit	⊻iew	<u>D</u> ata	<u>T</u> ransform	<u>A</u> nalyze	<u>G</u> raphs	<u>U</u> tilities Ad	d- <u>o</u> ns <u>W</u> indo	w <u>H</u> elp	
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1:									Visible: 1 of 1	1 Variables
			у	va	r	var	var	var	var	
	1	M								^
	2	M								
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	10									
	11									
	12									
	12	•		3335						• •
Data	a View	Varia	able View							
						SI	SS Statistics	Processor is rea	dy	

The first step is to create a new variable. To do this, **Transform > Compute Variable.** The "Target Variable:" box type in a name for the new variable (for example: Male).

In the "numeric expression:" box type in "1".

Compute Variable		×
Iarget Variable: Male Type & Label Y	Numeric Expression: 1 + > + > - = 4 5 * = 1 2 / & / & * = / & / & * * *	tral CDF
[f]у="М"		
ОК	Paste Reset Cancel Help	

Click on the "If..." button. A new menu will pop up. The new menu will look like the one presented below.

🚰 Compute Variable: If Cases		×
€а у (Include <u>all</u> cases Include i<u>f</u> case satisfies condition: y="M" 	Function group:
	+ < > 7 8 9 - <= >= 4 5 6 * = ~= 1 2 3 / & 1 0 . ** ~ () Delete	Arithmetic CDF & Noncentral CDF Conversion Current Date/Time Date Arithmetic
	Continue Cancel Help	

You will need to put the formula for male into the box. Y = "M" is the formula given where "Y" is the original variable name for the qualitative data ("M" or "F").

Click on the **Continue** button. Click **OK**.

Your dataset should now look like the one below.

D 🖬	ntitled1	[Data	Set0] - S	PSS Statis	tics Data I	Editor					
<u>F</u> ile	<u>E</u> dit	⊻iew	<u>D</u> ata	<u>T</u> ransform	<u>A</u> nalyze	<u>G</u> raphs	Utilities	Add- <u>o</u> r	ns <u>W</u> indow	Help	
🕞	2	ШŤ	♠ ♥	🔚 📑	? M	+	H	📑 🤅	ý 💊 🍋 🛛	abç	
3:									N	/isible: 2 of 2	Variables
			у	М	ale	var		var	var	var	
	1	M			1.000						_
	2	M			1.000						
	3	F									
	4	F									
	5	M			1.000						
	6	F									
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- Dect			della Coloria								
Data	VIEW	Varia	weiv eige			er		tion Droom	accor io rood		
						151	้วว วเสมร	ucs proc	essor is ready		

Now you will need to repeat the process for females.

To do this, **Transform > Compute Variable.** The "Target Variable:" box type in the variable name that you used previously (for example: Male). If you are doing this immediately after the first part of this procedure, then the variable name will already be typed in.

Change the "Numeric Expression" from 1 to 0. (see below)

🚰 Compute Variable	×
Iarget Variable:	Numeric Expression: 0 + < > 7 8 9 - <= >= 4 5 6 * = -= 1 2 3 / & 1 0 . / & 1 0 . * * () Delete / Delete
ОК	Paste Reset Cancel Help

You should now have the dialog box below on your screen.

Compute Variable: If Cases		×
Male	Include <u>a</u> ll cases Include if case satisfies condition: Y="F" Function group:	
	+ > 7 8 9 - = > 4 5 6 * = = 1 2 3 / & I 0 . / & I 0 . ** * () Delete Image: Second Special Variable	
	Continue Cancel Help	

Click on the "If..." button. Change the equation to y = F' and click on the **Continue** button. Then click **OK**.

When the dialog box pops up that asks "Change existing variable?" click **OK**.



You should now have an indicator (dummy) variable which can be used in regression analysis.

Creating New Variables that are Functions of Other Variables

You can create new variables that are a function of any other variables in your dataset.

arget Variable: e2 Type & Label Variationse variationse	 Num <u>e</u> ric Expression: RES_1 * RES_1	
 Homper Rentper Indper Utilper PRE_1 RES_1 yhatsq yhatsq yhatsq ressq ressq ressq RES_2 RES_2 ysq ysq PRE_3 	+ > 7 8 9 All - <=	oup: central CDF te/Time netic

To do this, you need to **Transform > Compute Variable**.

The "target variable" should be what you wish to name the variable that you are creating.

The "numeric expression" is the formula that you use to create the variable. In the example above a variable called e2 was created where $e2 = RES_1 * RES_1$ (or the residual squared).

Generating Descriptive Statistics of Data

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Descriptive Statistics> Frequency.
- 3. Move the (qualitative or quantitative) variables that you wish to calculate the frequency statistics of into the **Variable(s):** box. (In this example X1 and X2 will have frequency statistics calculated).

Frequencies			×
Ф у	•	Variable(s):	OK <u>P</u> aste <u>R</u> eset Cancel Help
Display frequency tables	\$		
	<u>S</u> tatistics	<u>C</u> harts <u>F</u> orma	ət

- 4. Select the **Statistics** button.
- 5. Check the boxes for each of the statistics that you wish to calculate.
- 6. Select the **Continue** button.

Frequencies: Statistics	×
Percentile Values Quartiles Quartiles Quartiles Quartiles Quartiles Percentile(s): Add Change Remove	Central Tendency Mean Median Mode Sum Values are group midpoints
Dispersion Std. deviation Minimum Variance Maximum Range S. <u>E</u> . mean	Distribution Ske <u>w</u> ness <u>K</u> urtosis

7. If you wish to plot the data in chart form, select the **Charts** button (See top illustration).

- 8. Hit the radial button for the chart that you wish to produce.
- 9. Select the **Continue** button.



- 10. You should be back at the original Frequencies window.
- 11. Select the **OK** button.

Generating Confidence Intervals

This page will describe how to create confidence intervals for the mean of a variable. This will not create confidence intervals for slope coefficients in a regression.

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Descriptive Statistics> Explore
- 3. Move the variables that you wish to calculate the confidence interval for into the **Dependent List:** box. (In this example X1 and X2 will have confidence intervals calculated).
- 4. In the display box, select the **Statistics** radial button.

Explore	×
✓ y	Dependent List: Image: Width of the section of t
	Eactor List:
	Label <u>C</u> ases by:
Display ○ <u>B</u> oth	Statistics Plots Options

- 5. Select the **Statistics** button.
- 6. Type in the significance level for the confidence interval you wish to create. The default is a 95% confidence interval. This will create a 95% confidence interval for the mean of the variables in the dependent list.
- 7. Select the **Continue** button.



- 8. You should be back at the original Explore window.
- 9. Select the **OK** button.

One-Way Contingency Table

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Nonparametric Tests> Chi-Squared.
- 3. Move the Categorical variable(s) into **Test Variable List** box.

Chi-Square Test				×
Category_2	•	[est Variable List:		OK Paste Reset Cancel
Expected Range	1 [Expected Values	-, L	Help
Get from data		C All categorjes equal		
O Use <u>specified</u> range				
Lower:		Add 5		
Upper:		Change 15		
		Remove	<u>O</u> pt	ions

- 4. In the **Expected Values** box select one of the radial buttons.
 - a. If all of the categories have the same expected probability select: All categories equal.
 - b. If the categories have different expected probabilities select: Values and Add the probabilities for the categories. The order of the values is important; it corresponds to the ascending order of the category values of the test variable. The first value of the list corresponds to the lowest group value of the test variable, and the last value corresponds to the highest value.
- 5. Click on the **OK** button.

Two-Way Contingency Table

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Regression> Linear Regression.
- 3. Move the dependent variables into **Dependent:** box.
- 4. Move the independent variables into **Independent(s):** box.

Analyze*Descriptive Statistics*Crosstabs

Crosstabs	×
Bgw(s): Category_1 Column(s): Category_2 Layer 1 of 1 Previous	OK Paste Reset Cancel Help
Display clustered bar charts	
Suppress tables	
<u>S</u> tatistics <u>Ce</u> lls <u>F</u> orm	at

Crosstabs: Statistics		×		
Chi-square Nominal Contingency coefficient Phi and Cramér's V Lambda Uncertainty coefficient	Correlations Ordinal <u>G</u> amma <u>S</u> omers' d <u>Kendall's tau-b</u> Kendall's tau- <u>c</u>	Continue Cancel Help		
Nominal by Interval	Карра			
🗖 <u>E</u> ta	🗖 R <u>i</u> sk			
	🔲 <u>M</u> cNemar			
Cochr <u>a</u> n's and Mantel-Haenszel statistics Test common odds ratio equals:				

Generating Descriptive Statistics of Numerical Data

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Descriptive Statistics> Descriptives
- 3. Move the variables that you wish to calculate the descriptive statistics of into the **Variable(s)**: box. (In this example X1 and X2 will have descriptive statistics calculated).

Descriptives		×
	Variable(s):	OK <u>P</u> aste <u>R</u> eset Cancel Help
Save standardized value	es as variables	Options

- 4. Select the **Options** button.
- 5. Check the boxes for each of the statistics that you wish to have generated in SPSS. (In this case the sample mean, standard deviation, minimum, and maximum will be calculated).
- 6. Select the **Continue** button.

Descriptives: Opti	ons	×
Mean	□ <u>S</u> um	Continue
□spersion S td. deviation	Mi <u>n</u> imum	Cancel
□ <u>V</u> ariance	🔽 Ma <u>x</u> imum	
🗖 <u>R</u> ange	🔲 S. <u>E</u> . mean	
Distribution		
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Display Order		
• Varia <u>b</u> le list		
C <u>A</u> lphabetic		
C Ascending mea	ans	
C <u>D</u> escending m	eans	

7. You will be back at the previous screen. Select **OK** to create the descriptive statistics.

Generating Correlation Matrix

This will present the Pearson's correlations (assumption of normality) for your dependent and/or independent variables. You will need to create the correlation matrix of ALL independent variables to test for multicollinearity.

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Correlate> Bivariate
- 3. Move the variables that you wish to calculate the confidence interval for into the **Variables:** box. (In this example Y, X1 and X2 will be in the correlation matrix).
- 4. In the **Correlation Coefficients** box, make sure that Pearson is checked (Unless you wish to do a different correlation calculation. Pearson is the most popular and Spearman is the second most popular).
- 5. Select the two-tailed or one-tailed (whichever is appropriate) radial button.
 - Bivariate Correlations X Variables: 0K <u>P</u>aste <u>R</u>eset ۰. Cancel Help **Correlation Coefficients** Pearson 🗌 Kendall's tau-b Spearman Test of Significance • <u>T</u>wo-tailed One-tailed Options... Flag significant correlations
- 6. Select OK.

Linear Regression

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Regression> Linear Regression.
- 3. Move the dependent variables into **Dependent:** box.
- 4. Move the independent variables into **Independent(s):** box.

Linear Regression		×
✓ ×1 ✓ ×2	Dependent: y Block 1 of 1 Preyjous Independent(s): X1 X2 Method: Enter	OK <u>P</u> aste <u>R</u> eset Cancel Help
	Selection Variable: Pigle Case Labels: WLS Weight: Statistics Plots Save Opti	ions

- 5. Select the **Statistics** button.
- 6. Check all the boxes by the statistics that you wish SPSS to calculate. The **Covariance matrix** can be used to check for multicollinearity. The **Durbin-Watson** can be used to test for autocorrelation.
- 7. Select the **Continue** button.

linear Regression: Statistics	×
Regression Coefficients Model fit Estimates R guared change Confidence intervals Descriptives Covariance matrix Part and partial correlation Collinearity diagnostics	Continue Cancel Help
Residuals	
☑ D <u>u</u> rbin-Watson	
Casewise diagnostics	
© Outliers outside: 3 standard deviations	
C All cases	

- 8. You will now be at the original Linear Regression window.
- 9. If you wish to use graphical analysis to test for normality or possible heteroskedicity, then select the **Plots** button; otherwise, continue on to step 12 (as shown in the illustration in step 4 above).
- 10. Check the **Normal Probability Plot** to test for normality and/or the **Produce all partial plots** to test for heteroskedacitiy.
- 11. Click on the **Continue** button.

Linear Regression: P	ots	×
DEPENDNT *ZPRED *ZRESID *DRESID *ADJPRED *SRESID *SDRESID	Scatter 1 of 1 Preyious Next Y: X: X: al Plots Image: Produce all partial plots	Continue Cancel Help
<u>H</u> istogram		
Normal probability	plot	

- 12. You will now be at the original Linear Regression window (Shown in step 4).
- 13. If you wish to save either the residuals or the predicted values of the dependent variable for other tests or corrections, then click on the **Save** button; otherwise, continue on to step 16.
- 14. Check **Unstandardized** in the "Predicted Values" box to get \hat{y} and/or check **Unstandardized** in the "Residuals" box to get $y \hat{y}$.
- 15. Click on the **Continue** button.

Linear Regression: Save	×
Predicted Values Residuals ✓ Unstandardized Unstandardized Standagdized Standardized Adjusted Studentized S.E. of mean predictions Deleted Distances Influence Statistics Cook's DtBeta(s) Leverage values DtBeta(s) Prediction Intervals Standardized DtBeta(s) Onfidence Interval: 95 % Coefficient statistics Covariance ratio Create coefficient statistics Covariance ratio © Create a new dataset Dataset name; Write a new data file File Export model information to XML file Browse Include the covariance matrix Stower	Continue Cancel Help

- 16. You will now be at the original Linear Regression window (Again shown in step 4).
- 17. If your data set has missing values or you wish to run the regression through the origin (no y-intercept), the click on the Options button; otherwise go to step 21.
- 18. If you are forcing the sample regression line through the origin, then get rid of the check mark in front of **Include constant in the equation**.
- 19. If you have omitted variables, then you need to decide how the program will handle the omitted variables. In the **Missing Variables** box: **Exclude cases listwise** will exclude the whole case if there is a missing observation in the case and **Replace with mean** will replace any missing observation with that variable's mean.
- 20. Click on the **Continue** button.

Linear Regression: Options	×
Stepping Method Criteria ● Use probability of F Entry: Image: Stepping Method Criteria ● Use probability of F Entry: Image: Stepping Method Criteria ● Use probability of F Image: Stepping Method Criteria ● Use probability of F Image: Stepping Method Criteria ● Use probability of F Image: Stepping Method Criteria Image: Stepping Method Criteria <	Continue Cancel Help
Missing Values	
Exclude cases listwise	
C Exclude cases pairwise	
© <u>R</u> eplace with mean	

- 21. You will now be at the original Linear Regression window (See step 4).
- 22. Click on the **OK** button.

You will not need to check any boxes for this class that are not checked in the example above.

Szroeter's Test (Heteroskedasticity)

You need to get two things to do the test.

- The unstandardized residuals.
- The rank of the independent variable that you believe to be heteroskedastic

To compute the unstandardized residuals, you will need to run a regression. When you are in **Analyze > Linear Regression**, click on the **SAVE** button .

🛃 Linear Regression: Save	X			
Predicted Values	Residuals			
Unstandardized	✓ Unstandardized			
Standa <u>r</u> dized	Standardized			
Adjusted	Studentized			
S.E. of mean predictions	Deleted			
	Studentized deleted			
Distances	Influence Statistics			
Ma <u>h</u> alanobis	Df <u>B</u> eta(s)			
Coo <u>k</u> 's	Standardized DfBeta(s)			
Leverage values	D <u>f</u> Fit			
Prediction Intervals	Standardized DfFit			
Mean Individual	Covariance ratio			
Confidence Interval: 95 %				
Coefficient statistics				
Create coefficient statistics				
Create a new dataset				
Dataset name:				
O Write a new data file				
File				
Export model information to XML file				
Browse				
✓ Include the covariance matrix				
Continue Cancel Help				

When the above dialog appears, check "Unstandardized" in the Residuals box.

To compute the rank of the independent variable that is believed to be heteroskedastic do the following:

🚰 CityDat.sa	v [DataSet1]	- SPSS Sta	tistics Dat	a Editor			
<u>F</u> ile <u>E</u> dit <u>\</u>	/iew <u>D</u> ata	Transform	<u>A</u> nalyze	<u>G</u> raphs	Utilities	Add- <u>o</u> ns	<u>W</u> indow
🗁 📕 🚑	📴 🔶 🖻	📑 <u>C</u> ompute	e Variable			- IV (🌛 🌑 🕹
	Name	x? C <u>o</u> unt ∨	alues withir	n Cases			Label
1	C1	Shi <u>f</u> t Va	lues				
2	sizehse	X•X Recode	into Same \	/ariables			
3	IncomeSq	xy Recode	into Differei	nt Variables.			
4	incom72	🔊 –	ic Recode				
5	taxrate	Visual B	inning				
6	Comper					_	
7	county	Ran <u>k</u> Ca	ises			_	
8	city	🗎 Date and	d Time Wiza	rd			
9	totexp	🗠 Create T	ï <u>m</u> e Series.				
10	taxbase	<table-of-contents> Replace</table-of-contents>	Missing <u>∨</u> a	lues			
11	рор73	🔊 Random	Number <u>G</u> e	enerators			
12	hseval	Rup Pen	dina Transf	orms	Otri-G	_	
13	Taxhse	TARTIER		· · · ·	J		
14	year	Numeri	c 11	1 (D		

When the Rank Cases dialog appears, put one of your independent variables in the **Variable(s)**: box as I did below with "taxrate".

Rank Cases		×
 C1 sizehse IncomeSq incom72 Comper county city totexp taxbase 	▲ Variable(s): ★ taxrate By:	Ran <u>k</u> Types
Assign Rank 1 to Smallest value Largest value	✓ <u>D</u> isplay summary tables	
ок	Paste Reset Cancel	Help

Next you will need to create two variables:

- 1. Rank * Residual
- 2. Residual * Residual

To do this, you need to **Transform > Compute Variable**.

Homper Rentper Rentper Williper PRE_1 PRE_1 PRE_1 PRE_1 PRE_2 PRE_2 PRE_3 PRE_3 PRE_3	Compute Variable Iarget Variable: e2 Type & Label Y raxiise year	-	Num <u>e</u> ric Expression: RES_1 * RES_1
[f] (optional case selection condition)	 Homper Rentper Indper Utilper PRE_1 RES_1 Yhatsq yhatsq yhatcub Rtaxrate Rtaxrate ressq ressq ressq ressq ressq PRE_2 RES_2 ysq ycube PRE_3 	tion cond	+ > 7 8 9 - > 7 8 9 - = + 5 6 * = - 1 2 3 / & I 0 . CDF & Noncentral CDF / & I 0 . Delete Delete ** ~ () Delete Delete Eunctions and Special Variable tion)

The "target variable" should be what you wish to name the variable that you are creating. The "numeric expression" is the formula that you use to create the variable. An example of the residual squared is given in the box above.

Finally you will need to calculate the sum of the two variables that you just created. To do this, run **Analyze > Descriptive Statistics > Descriptives**.

Put the two variables just created in your "Variable(s):" list as shown below and select the OPTIONS button.

Descriptives			×
 yhatsq yhatcub Rtaxrate PRE_2 RES_2 ysq ycube PRE_3 RES_3 		<u>V</u> ariable(s): ∳ ressq ∳ ressqrank	Options
Save standardi <u>z</u>	ed values as variabl	es <u>R</u> eset Cancel	Help

In the Options section you want to check the "Sum" box at the top.

🔁 Descriptives: Option	ns 🔀
🔲 Mean 🔍 S	<u>s</u> um
Dispersion	
Std. deviation	Minimum
□ <u>V</u> ariance □	Ma <u>x</u> imum
Range	S. <u>E</u> . mean
Distribution	
<u>K</u> urtosis	Ske <u>w</u> ness
Display Order	
O Variable list	
◯ <u>A</u> lphabetic	
O Ascending means	
O Descending means	
Continue Car	Help

Analysis of Variance (ANOVA)

The ANOVA test will text for equality of means between two or more samples.

- 1. Open or create the data you wish to analyze (see appropriate directions). The "y" variable should have the observations that you need to test in it. The "x1" variable should be a key to which sample the data comes from.
- 2. In SPSS select, Analyze> Compare Means > One-Way ANOVA.

📴 One-Way ANOVA			×
✓ ×2		endent List: Y	Contrasts Post <u>H</u> oc Options
ОК Ра	ste <u>R</u> ea	or: ×1 set Cancel	Help

Based upon the test that we do in class, you will select the "Bonferroni" test.

One-Way ANOVA: Post Hoc Multiple Comparisons				
Equal Variances	Assumed			
	<u>s</u> -N-К	<u>W</u> aller-Duncan		
Bonferroni	<u> <u>T</u>ukey</u>	Type I/Type II Error Ratio: 100		
Sidak	Tu <u>k</u> ey's-b	Dunnett		
Scheffe	Duncan	Control Category : Last		
<u>R</u> -E-G-W F	Hochberg's GT2	Test		
R-E-G-W Q	<u>G</u> abriel	● <u>2</u> -sided ○ < Control ○ > Control		
Equal Variances Not Assumed				
Tamhane's T2 Dunnett's T3 Games-Howell Dunnett's C				
Significance level: 0.05				
Continue Cancel Help				

Categorical Data Analysis (One-Way Chi-Squared Test)

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Nonparametric Tests > Chi-Square.

Chi-Square Test		
✓ x1 ✓ x2	Test Variable List: Options	
	✓	
Expected Range	Expected Values	
Oet from data	 All categories equal 	
Use specified range	O Values: Add Change Remove	
OK <u>P</u> aste <u>R</u> eset Cancel Help		

Spearman's Rank

To test for correlations when there is NO underlying distribution, use Spearman's rank.

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Correlate > Bivariate.
- 7. Move the variables that you wish to calculate the confidence interval for into the **Variables:** box. (In this example X1 and X2 will be in the correlation matrix).
- 8. In the **Correlation Coefficients** box, make sure that Spearman is checked. Pearson assumes normality and Spearman is the non-parametric correlation.
- 9. Select the two-tailed or one-tailed (whichever is appropriate) radial button.
- 10. Select OK.

Bivariate Correlations	×
✓ Y ✓ X1 ✓ X2	Options
Correlation Coefficients	
Test of Significance Image: State of Significance Image: State of Significance Image: State of State	
✓ Flag significant correlations OK Paste Reset Cancel	lelp

Control Charts

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Analyze> Quality Control > Control Charts.

🚺 Control Charts	×
Variables Charts	
X-bar, R, s	
Individuals, Moving Range	
Attribute Charts	
qn, q	
c,u	
Data Organization	
Ocases are units	
◯ Ca <u>s</u> es are subgroups	
Define Cancel Help	

🙀 X-bar, R, s: Cases Are Units	×
✓ x1	Process Measurement: ✓ y Subgroups Defined by: ✓ x2 dentify points by: Process Measurement: <u></u>
Char ⊙ <u>x</u> ⊙ x	ts -bar using range - <u>b</u> ar using standard deviation Display R chart
	plate Apply chart template from: Eile Reset

🗱 X-bar, R, s: Statistics 🛛 🗙				
Specification	Limits	Capability	Sigma	
Upper:		 Estimate 	e using <u>R</u> -bar	
Lower:		◯ E <u>s</u> timate	eusing S-bar	
Target:		🔵 Using <u>w</u>	thin subgroup variation	
Actual % outside specification limits				
Process Capability Indices Performance Indices				
□ <u>C</u> P □ Cp <u>M</u> □ PP □ <u>Z</u> -upper				
CpU Z-upper PpU Z-lower				
CpL Z-lower PpL Z-min				
Πĸ	Z-mi <u>n</u>	🗌 РрК	Z-ma <u>x</u>	
СрК	Z-max	PR	Z-out	
CR	Z-out	PpM		
Continue Cancel Help				

🚰 X-bar, R, s: Control Rules	×		
Select all control rules			
Above +3 sigma	Below -3 sigma		
2 out of last 3 above +2 sigma	2 out of last <u>3</u> below -2 sigma		
4 out of last 5 above +1 sigma	4 out of last <u>5</u> below -1 sigma		
8 points above center line	8 points below center line		
6 in a row trending up	6 in a row trending down		
14 in a row alternating			
Continue Cancel Help			

Creating Plots

- 1. Open or create the data you wish to analyze (see appropriate directions).
- 2. In SPSS select Graphs> Chart Builder.
- 3. Move the dependent variables into **Dependent:** box.
- 4. Move the independent variables into **Independent(s):** box.



Graph Builder uses "Drag and Drop" to choose the Chart Style, X-Axis, and Y-Axis.