Handout for PS104A
Review of Hypothesis Tests in SPSS

This sheet presents the results of different hypothesis tests in SPSS to demonstrate when you would accept or reject a null hypothesis.

Here's a simple t test, with a null hypothesis of 50. The mean in the sample was 55.78, and the t score was 11.42. The "Sig" tells us how likely it is we would get a sample mean that far from our null hypothesis if our null hypothesis was correct (how much probability was cut off in the tail of the t distribution). Assume we're using a 5% level of significance, meaning if the sample estimate is out in the last 5% of the t distribution that is centered around my null hypothesis, I would reject the null. Based on these results you would reject the null hypothesis.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
APPROVE	603	55.78	12.631	.514

One-Sample Test

	Test Value = 50					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
APPROVE	11.242	602	.000	5.78	4.77	6.79

Here's a t test with a null hypothesis of 55. Assuming a 5% level of significance, you would accept the null hypothesis in this case.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
APPROVE	603	55.78	12.631	.514

One-Sample Test

	Test Value = 55					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
APPROVE	1.522	602	.129	.78	-.23	1.79

Hypothesis testing in regression is also based on a t test. What happens is you hypothesize some relationship between variables (positive or negative). Then you run the regression and get a slope coefficient. This tells you if the relationship between the variables you care about was positive or negative in the sample. You then test this slope coefficient against a null hypothesis of zero. This is just like the t tests shown above, expect the null hypothesis is always zero. If you accept the null hypothesis, then you conclude there is no relationship between the variables, and your original research hypothesis of a positive or negative relationship is wrong. If you reject the null hypothesis, you conclude the relationship between the variables is the same as the sign of the slope coefficient. If it matches your research hypothesis, you can conclude you have evidence in favor of this hypothesis.

Suppose you had a hypothesis that unemployment has a negative effect on Presidential approval. You run a regression of approval on unemployment and get the following results:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	67.289	1.869		35.995	.000
	Unemployment	-1.939	.304	-.253	-6.382	.000

a. Dependent Variable: APPROVE

Look first at the "B" column: these are the regression coefficients. The first row is the constant, which tells you what approval would be if unemployment was zero. The second row is for unemployment, which tells you that the regression line slopes downward (slope is –1.939): as unemployment gets higher, approval gets lower. This matches our research hypothesis. We then test this slope coefficient against zero to see if we can conclude that unemployment has a negative effect on approval in the population as well as in the sample. The t score from this test is in the "t" column, and is –6.382. The "Sig" gives us exactly the same information as in the t tests shown above. In this case the Sig is .000, meaning we reject the null hypothesis of zero, and conclude that unemployment does in fact have a negative effect on approval in the population. We say that unemployment has a statistically significant effect on approval.

Finally, here's an example of a statistically insignificant regression coefficient. I put this together from a survey --- "Q37" just means "Question 37." Note that the coefficient of 5.553E-02 is in scientific notation --- the E-02 means "move the decimal 2 places to the left," so this coefficient is 0.05553.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.898	.234		12.391	.000
	Q37	5.553E-02	.072	.024	.768	.443

a. Dependent Variable: Q26

We can see from this output that variable Q37 did not have a statistically significant effect on the dependent variable Q26. In other words, we could not reject the null hypothesis of zero for the slope coefficient on variable Q37.