Jake Schinto

Homework #7

1.

ANOVA table				
Source	S.S.	d.f.	M.S.	F-test
Regression	1848.76	1	1848.76	69.216
Error	480.78	18	26.71	

Parameter Estimates				
Variable	Coefficient	s.e.	t-test	p-value
Intercept	-23.4325	12.74	-1.8393	0.0824
X	1.2713	0.1528	8.32	<0.0001

n	R^2	$\hat{\sigma}$
20	0.7936	480.78

How to find SS_{Error} without SS_T or Data?

$SS_T = SS_{yy} = SS_R + SS_{Res}$ $\quad SS_R = 1848.76 = \beta_1^2 S_{xx}$

$$12.74 = \sqrt{MS_{Res}\left(\frac{1}{20} + \frac{\bar{X}^2}{S_{xx}}\right)}$$

$$0.1528 = \sqrt{MS_{Res} / S_{xx}}$$

$$162.3076 = MS_{Res}\left(\frac{1}{20} + \frac{\bar{X}^2}{S_{xx}}\right)$$

$0.02335 = MS_{Res} / S_{xx}$ $\quad MS_{Res} = 0.02335 \cdot S_{xx}$

$$162.3076 = \frac{0.02335 \cdot S_{xx}}{20} + 0.02335 \cdot \bar{X}^2$$

$$20 \cdot (6951.718 - \bar{X}^2) = S_{xx} = \frac{1848.76}{\beta_1^2}$$

$t^*(\beta_1) = 8.32 = \frac{\beta_1}{0.1528}$ $\quad \beta_1 = 1.2713$

$S_{xx} = 1848.76/(1.2713)^2 = 1143.8905$

$0.02335 = MS_{Res} / 1143.8905$

$MS_{Res} = 26.7098$

F-test $= 1848.76/26.71 = 69.216$

$SS_{Res} = 26.71 \cdot (20-2) = 480.78 = \hat{\sigma}^2$

$SS_T = 480.78 + 1848.76 = 2329.54$

$R^2 = 1848.76/2329.54 = 0.7936$

$t^*(\beta_0) = -23.4325/12.74 = -1.8393$

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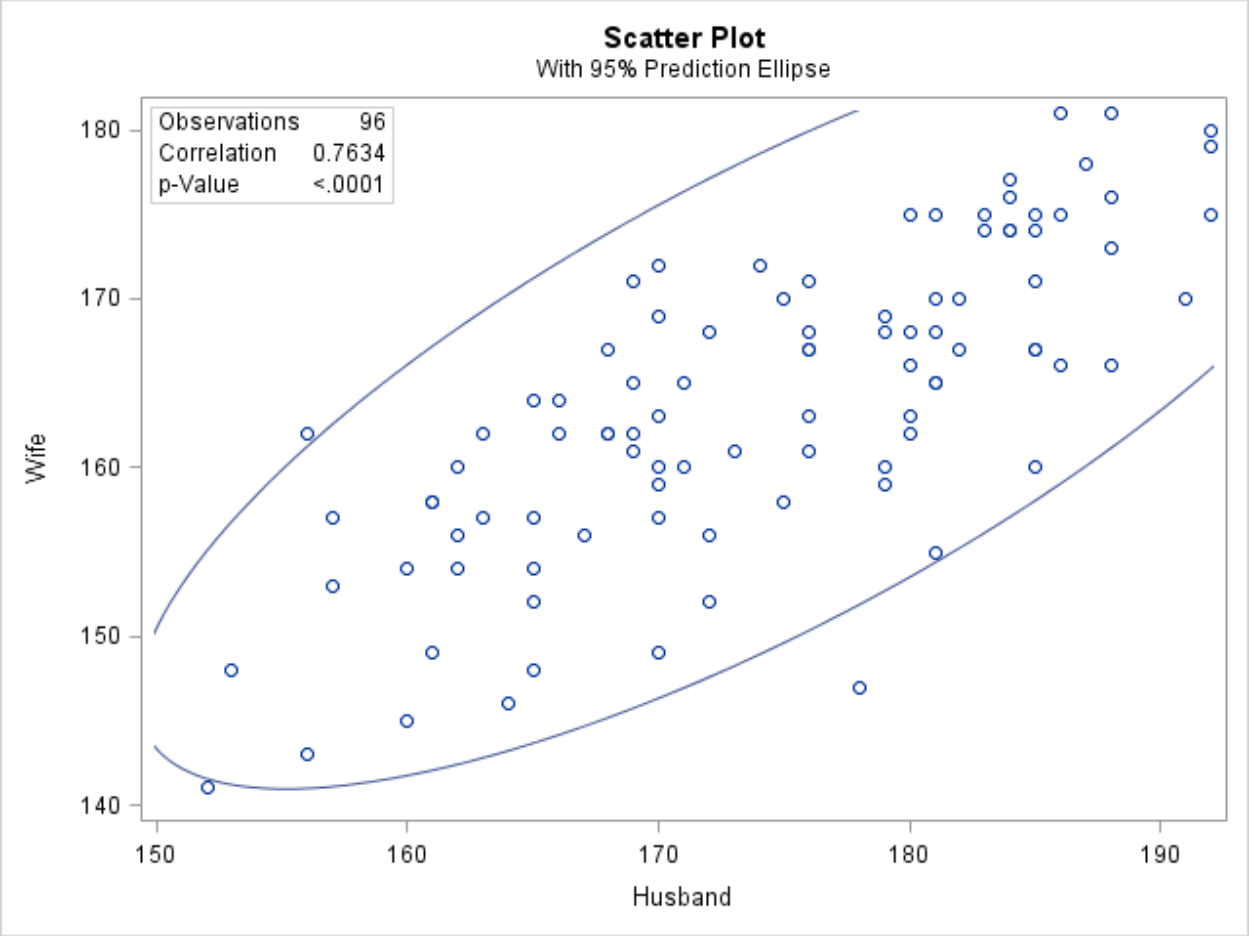
Math 312

Homework 7

a.



The scatterplot seems to moving in an upward trend as x increases. This signals that an association most likely exists and that a best fit line could be made, making a likely correlation between husband and wife heights.

b.

Pearson Correlation Coefficients, N = 96 Prob > |r| under H0: Rho=0		
	Husband	Wife
Husband	1.00000	0.76339 <.0001
Wife	0.76339 <.0001	1.00000

Spearman Correlation Coefficients, N = 96 Prob > |r| under H0: Rho=0		
	Husband	Wife
Husband	1.00000	0.76107 <.0001
Wife	0.76107 <.0001	1.00000

Pearson Correlation Statistics (Fisher's z Transformation)							
Variable	With Variable	N	Sample Correlation	Fisher's z	95% Confidence Limits		p Value for H0:Rho=0
Husband	Wife	96	0.76339	1.00428	0.664619	0.835934	<.0001

Spearman Correlation Statistics (Fisher's z Transformation)							
Variable	With Variable	N	Sample Correlation	Fisher's z	95% Confidence Limits		p Value for H0:Rho=0
Husband	Wife	96	0.76107	0.99875	0.661522	0.834262	<.0001

Looking at the Pearson and Spearman Coefficients we would reject the null hypothesis that Rho=0 because in both cases, the p-value is unusually small (<.0001). This means that Rho is not 0 and there is evidence of a correlation. In addition to that, by looking at the Fisher tables, there is a 95% Confidence interval shown and in both cases 0 is not within the range. Both prove that a correlation exists in this data set.

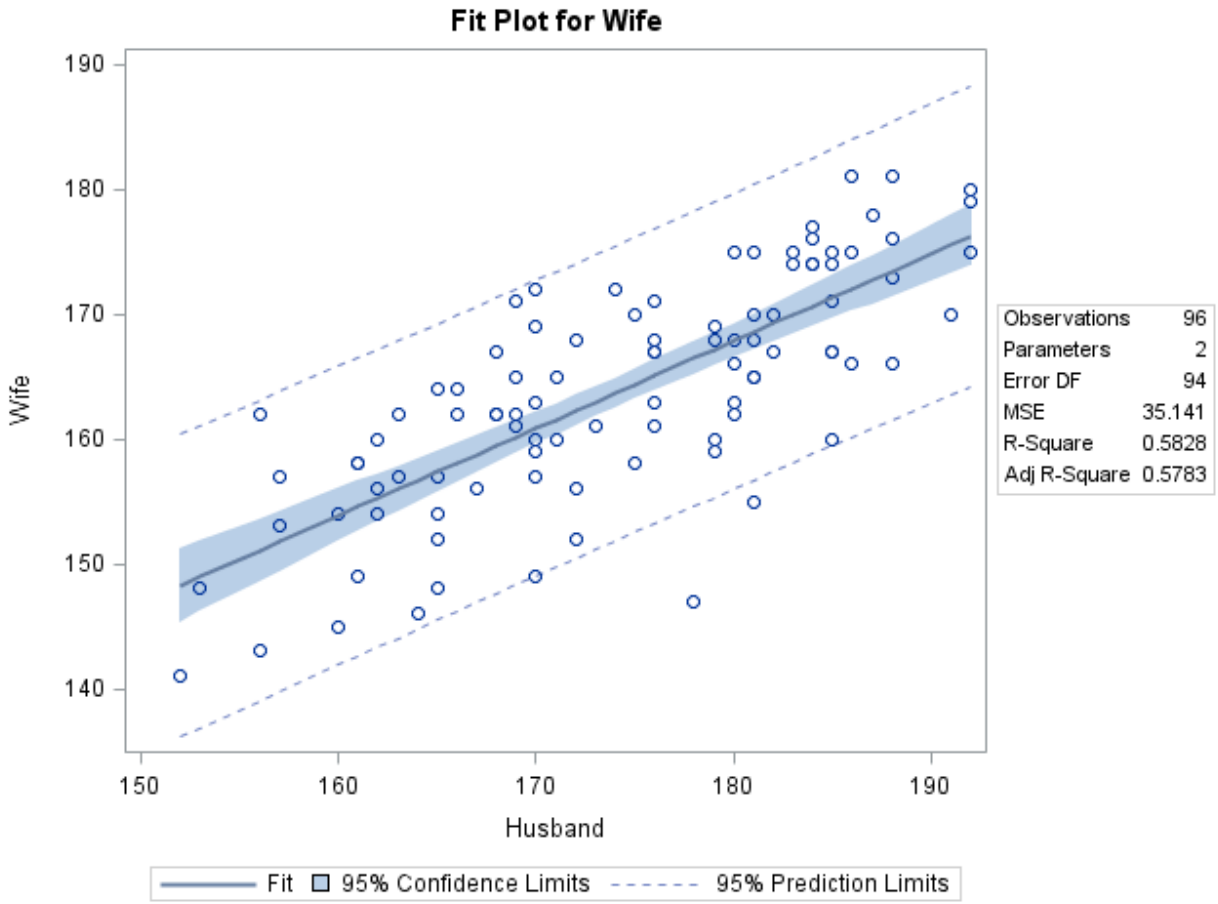
c.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	4613.67707	4613.67707	131.29	<.0001
Error	94	3303.28127	35.14129		
Corrected Total	95	7916.95833			

Root MSE	5.92801	R-Square	0.5828
Dependent Mean	163.89583	Adj R-Sq	0.5783
Coeff Var	3.61694		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	41.93015	10.66162	3.93	0.0002
Husband	1	0.69965	0.06106	11.46	<.0001

Looking at the Pr > F value and Pr > |t| for the Husband variable, we see that the p-value is unusually small (<.0001) and so we reject B1 = 0 and determine that some sloped regression line does exist.



There were no serious violations, so the best fit line is shown above. The slope of the line means that there is most likely a positive correlation between the heights of husbands and wives.