EE325 Section 2 HW 5 Answers

10.12

(a) **False.** If exact linear relationship(s) exist among variables, we cannot even estimate the coefficients or their standard errors.

(b) **False.** One may be able to obtain one or more significant t values.

(c) **False.** As noted in the chapter (see Eq. 7.5.6), the variance of an OLS estimator is given by the following formula:

$$var(\hat{\beta}_j) = \frac{\sigma^2}{\sum x_j^2}\left(\frac{1}{1 - R_j^2}\right)$$

As can be seen from this formula, a high R_j^2 can be counterbalanced by a low σ^2 or high $\sum x_j^2$.

(d) **Uncertain.** If a model has only two regressors, high pairwise correlation coefficients may suggest multicollinearity. If one or more regressors enter non-linearly, the pairwise correlations may give misleading answers.

(e) **Uncertain.** If the observed collinearity continues in the future sample values, then there may be no harm. But if that is not the case or if the objective is precise estimation, then multicollinearity may be problem.

(f) **False.** See answer to (c) above.

(g) **False.** VIF and TOL provide the same information.

(h) **False.** One usually obtains high R^2's in models with highly correlated regressors.

(i)**True.** As you can see from the formula given in (c), if the variability in X_3 is small, R_j^2 will tend to be small and in the extremej case of no variability in X_3, $\sum x_{3i}^2$ will be zero, in which case the variance of the estimated $\beta_3$will be infinite.

11.1 (a) **False.** The estimators are unbiased but are inefficient.

(b) **True.**

(c) **False.** Typically, but not always, will the variance be overestimated.

(d) **False.** Besides heteroscedasticity, such a pattern may result from autocorrelation, model specification errors, etc.

(e) **True.**

(f) **True.**

(g) **False.** Heteroscedasticity is about the variance of the error term u_i and not about the variance of a regressor.

11.16

a.

Source	SS	df	MS
Model	139022.82	1	139022.82
Residual	236893.616	53	4469.69087
Total	375916.436	54	6961.41549

Number of obs	=	55
F(1, 53)	=	31.10
Prob > F	=	0.0000
R-squared	=	0.3698
Adj R-squared	=	0.3579
Root MSE	=	66.856

foodexp	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
totalexp	.4368088	.0783226	5.58	0.000	.2797135	.593904
_cons	94.20878	50.85635	1.85	0.070	-7.796134	196.2137

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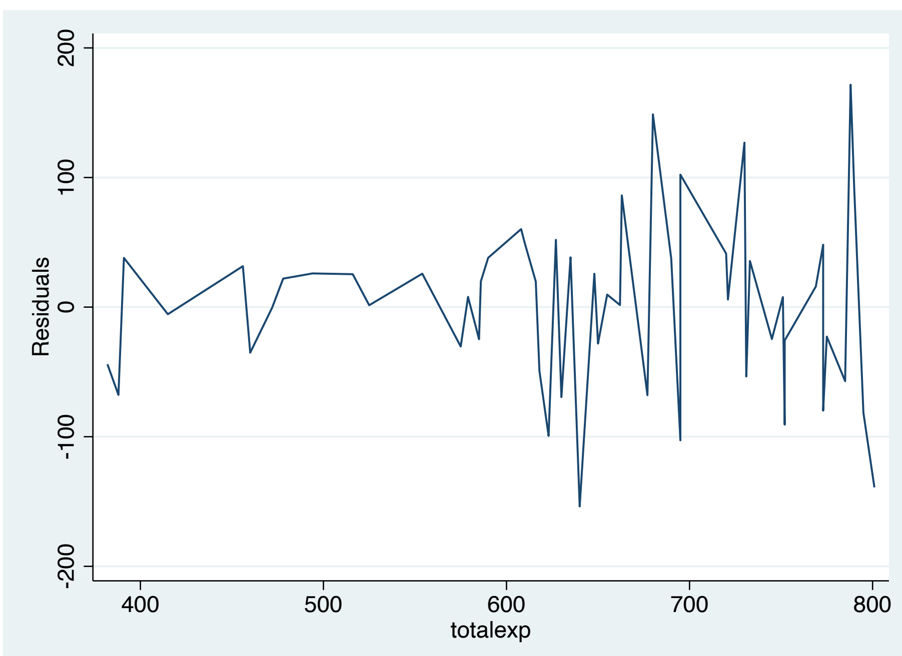
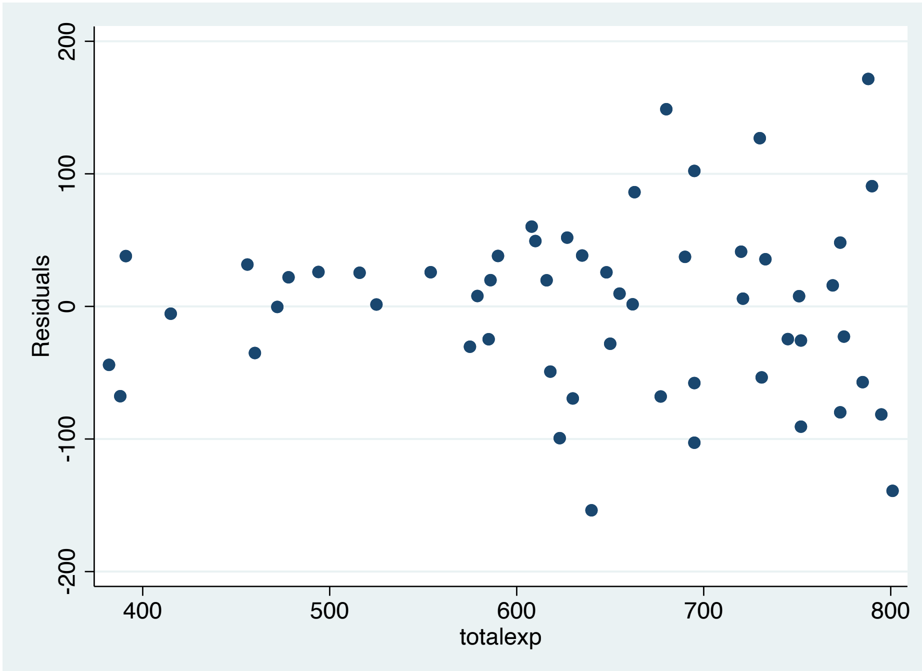
b) The residuals obtained from this regression look as follows:



Plotting residuals (R1) against total expenditure, we observe



It seems that as total expenditure increases, the absolute value of the residuals also increase, perhaps nonlinearly.

c)
White's general test statistic : 7.374513 Chi-sq(2) P-value = .025
H0= Homoscedasticity
H1= Otherwise
White's general test statistic : 7.374513
Critical Chi-sq(2) = 5.9914 (5% significance level)
Reject H0
There is enough evidence to say that there is heteroscedasticity

d) White's heteroscedasticity-consistent standard errors
Compared with the OLS regression results given in (a), there is not much difference in the standard error of the slope coefficient. although the standard error of the intercept has declined.

Linear regression

Number of obs	=	55
F(1, 53)	=	34.60
Prob > F	=	0.0000
R-squared	=	0.3698
Root MSE	=	66.856

foodexp	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
totalexp	.4368088	.0742544	5.88	0.000	.2878733	.5857442
_cons	94.20878	43.26305	2.18	0.034	7.434094	180.9835

12.26

a)

Source	SS	df	MS
Model	5.42774163	4	1.35693541
Residual	.370572985	25	.014822919
Total	5.79831462	29	.199941883

Number of obs	=	30
F(4, 25)	=	91.54
Prob > F	=	0.0000
R-squared	=	0.9361
Adj R-squared	=	0.9259
Root MSE	=	.12175

lnc	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lni	.4675086	.1659868	2.82	0.009	.1256524	.8093647
lnl	.2794423	.1147258	2.44	0.022	.0431602	.5157244
lnh	-.0051515	.142947	-0.04	0.972	-.2995564	.2892534
lna	.4414491	.1065083	4.14	0.000	.222091	.6608071
_cons	-1.500441	1.00302	-1.50	0.147	-3.5662	.5653184

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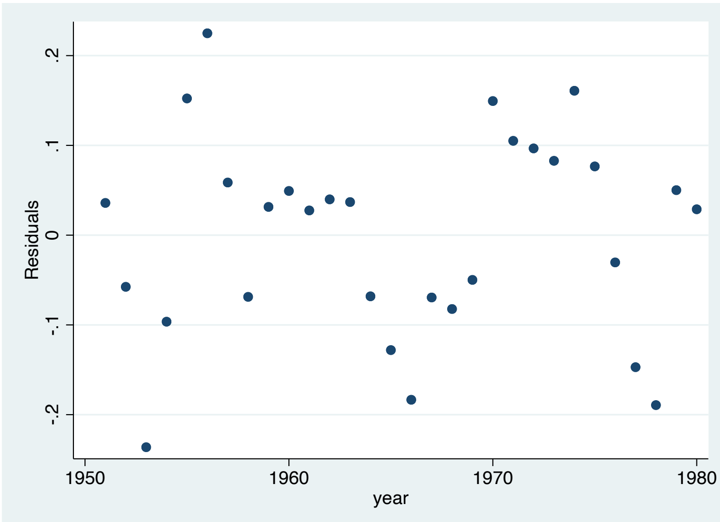
Interpret the meaning ………………… (Hint: Double log regression…. Must use the correct unit of analysis to receive full credits) b)



c)
H_0= No positive autocorrelation
H_1= Otherwise
H_0*= No negative autocorrelation
H_1*= Otherwise

Durbin–Watson d-statistic (5, 30) = .9549404
From Durbin–Watson table
dL=1.071
dU=1.833
4-dU=4-1.071
4-dL=4-1.833
Reject H_0= No positive autocorrelation
There is enough evidence to say that there is positive first-order autocorrelation.