Tasks for Introductory Econometrics

4. Multicollinearity

4.1 What is the problem of multicollinearity?

4.2 Which interpretation problems will occur in econometric model estimation in presence of multicollinearity?

4.3 Outline the methods for detecting multicollinearity.

4.4 What problems do the methods of variable suppression and the method of differences entail for overcoming multicollinearity?

4.5 The correlation matrix of the explanatory variables of the Energy Model III is given by

	GASPR	DHC	DIINC
GASP	1.000	0.749	-0.848
DHC	0.749	1.000	-0.589
DIINC	-0.848	-0.589	1.000

a) Assess the extent of multicollinearity on the basis of an advanced simple correlation analysis!
Note: The coefficient of determination in Energy Model III is 0.796.

b) Assess the extent of multicollinearity with the aid of the determinant of the correlation matrix of the exogenous variables!

c) What is the correlation between $\hat{\beta}_2$ and $\hat{\beta}_4$? What does it mean with regard to the values of the two regression coefficients and their significance?

4.6 Application of the auxiliary regression method yields the following estimation results in Energy Model III:

$$\widehat{GASP}_t = 0{,}912 + 0{,}807\ DHC_t - 0{,}00050\ DIINC_t, \quad R_2^2 = 0{,}825$$

$$\widehat{DHC}_t = 0{,}554 + 0{,}420\ GASP_t + 0{,}00006\ DIINC_t, \quad R_3^2 = 0{,}572$$

$$\widehat{DIINC}_t = 2244{,}304 - 1162{,}332\ GASP_t + 276{,}269\ DHC_t.\ R_4^2 = 0{,}723.$$

Make a diagnosis of multicollinearity using the tolerance coefficients and the variance inflation factors (VIF)!