EE 325
Quiz : Multicollinearity (5 points)

Due date: May 5, 2020 by email. (Please convert to pdf file before you submit)

1. From the annual data from the U.S. manufacturing sector for 1899-1922, Dougherty obtained the following regression results:

$$\widehat{\log Y_t} = 2.81 - 0.53 \log K + 0.91 \log L + 0.047t$$
$$\text{se} = (1.38) \quad (0.34) \quad (0.14) \quad (0.021)$$
$$R^2 = 0.97 \quad F = 189.8 \tag{1}$$

Where Y = index of real output
K = index of real capital input
L = index of real labor input
t = time or trend

Using the same data, he also obtained the following regression:

$$\widehat{\log\left(\frac{Y}{L}\right)} = -0.11 + 0.11 \log\left(\frac{K}{L}\right) + 0.006t$$
$$\text{se} = \quad (0.03) \quad (0.15) \quad (0.006)$$
$$R^2 = 0.65 \quad F = 19.5 \tag{2}$$

a. Is there multicollinearity in regression (1)? How do you know?
b. How would you justify the functional form of regression (1)? (Hint: Cobb-Douglas production function)
c. Interpret regression (1).
d. What is the logic behind estimating regression (2)?
e. If there was multicollinearity in regression (1), has that been reduced by regression (2)? How do you know?
f. If regression (2) is a restricted version of regression (1), what restriction is imposed by the author? (Hint: returns to scale.) How do you know if this restriction is valid? What test do you use? Show all your calculations.
g. Are the R^2 values of the two regressions comparable? Why or why not? How would you make them comparable, if they are not comparable in the present form?