DATA 3442 Lab 1

Due: 01/24/2025 23:59pm

10.38 Public university tuition: 2008 versus 2014. Table 10.2 shows the in-state undergraduate tuition in 2008 and 2014 for 33 public universities.[17] TUIT

(a) Plot the data with the 2008 tuition on the x axis and describe the relationship. Are there any outliers or unusual values? Does a linear relationship between the tuition in 2008 and 2014 seem reasonable?

(b) Run the simple linear regression and give the least-squares regression line.

(c) Obtain the residuals and plot them versus the 2008 tuition amount. Is there anything unusual in the plot?

(d) Do the residuals appear to be approximately Normal? Explain.

(e) The five California schools appear to follow the same linear trend as the other schools but have higher-than-predicted in-state tuition in 2014. Assume that this jump is particular to this state (financial troubles?) and remove these five cases and refit the model. How do the parameter estimates change?

(f) If you were to move forward with inference, which of these two model fits would you use? Write a short paragraph explaining your answer.

10.39 More on public university tuition. Refer to the previous exercise. We'll now move forward with inference using the model fit you chose in part (f) of the previous exercise. TUIT

(a) Give the null and alternative hypotheses for examining if there is a linear relationship between 2008 and 2014 tuition amounts.

(b) Write down the test statistic and P-value for the hypotheses stated in part (a). State your conclusions.

(c) Construct a 95% confidence interval for the slope. What does this interval tell you about the annual percent increase in tuition between 2008 and 2014?

(d) What percent of the variability in 2014 tuition is explained by a linear regression model using the 2008 tuition?

(e) Explain why inference on β_0 is not of interest for this problem.

10.40 Even more on public university tuition. Refer to the previous two exercises. TUIT

(a) The tuition at Skinflint U was $8800 in 2008. What is the predicted tuition in 2014?

TABLE 10.2 In-state Tuition and Fees (in Dollars) for 33 Public Universities

School	2008	2014	School	2008	2014	School	2008	2014
Penn State	13706	17955	Ohio State	8679	10995	Texas	8532	11094
Pittsburgh	13642	18075	Virginia	9300	13373	Nebraska	6584	8724
Michigan	11037	14126	Cal-Davis	8635	15589	Iowa	6544	8807
Rutgers	11540	14297	Cal-Berkeley	7656	14421	Colorado	7278	10388
Michigan State	10214	13771	Cal-Irvine	8046	14686	Iowa State	6360	8430
Maryland	8005	9734	Purdue	7750	10868	North Carolina	5397	8616
Illinois	12106	15938	Cal-San Diego	8062	14785	Kansas	7042	10760
Minnesota	10756	14889	Oregon	6435	10254	Arizona	5542	11205
Missouri	8467	10186	Wisconsin	7564	11429	Florida	3778	6748
Buffalo	6285	8784	Washington	6802	13757	Georgia Tech	6040	11094
Indiana	8231	10991	UCLA	7551	14224	Texas A&M	7844	9461

(b) The tuition at I.O.U. was $15,700 in 2008. What is the predicted tuition in 2014?

(c) Discuss the appropriateness of using the fitted equation to predict tuition for each of these universities.

10.41 Predicting public university tuition: 2000 versus 2014. Refer to Exercise 10.39. The data file also includes the in-state undergraduate tuition for the year 2000. TUIT

(a) Run the simple linear regression using year 2000 in place of year 2008. What is the least-squares line?

(b) Obtain the residuals and check model assumptions.

(c) If you had to choose between the model using 2008 tuition and the model using 2000 tuition, which would you choose? Give reasons for your answers.