BIOS 591P, Spring 2023 HW 04

Complete the following by **3pm Tuesday February 21, 2023**.

- Read chapter 7 in the textbook as follows:
- For practice, try the following problems from the textbook (but do not turn these in):
  - Chapter 7, problems 1 and 11. Do all work by hand (i.e., do not use SAS, R, Excel or any other computer software or any statistical functions on your calculator), *except for the following:* when performing F-tests, you may use the SAS PROBF function to compute F-test p-values (google for help –it works in a fashion similar to PROBNORM and PROBT, which I have been told was taught in Jose's section of BIOS 500).
  - Additional problems from the textbook, for practice –as many as you need in order to become comfortable with the material.
- Complete Q.1 to 5 below. Work all answers out carefully on paper first and then select the <u>most appropriate</u> answer choice. Do not use SAS/R/Excel or any statistical functions on your calculators; you may use simple mathematical functions (e.g., square, square root, addition/subtraction/division/multiplication) on hand-held calculators or smartphone calculator apps. If using statistical tables, use <u>only</u> the tables from the Kleinbaum text –do not use tables from any other source. When you have finalized all answers, enter your choices in Canvas in the 'HW 04' quiz item.

Q. 1-5. A biologist wished to study the effects of the temperature of a certain medium on the growth of human amniotic cells in a tissue culture. They conducted an experiment in which five cell lines were cultured at each of four temperatures. The number of cells was measured 7 days after culturing.

Edited SAS computer output for the regression of # of cells (Y) on temperature (X), is shown below. You will need the output to answer questions 1-8 below. It is very important that you answer the questions <u>in order</u>, and that you make sure you keep enough decimal places in all values used in calculations in order to assure that your final answer is accurate to the requested decimal places.

OF CELLS (Y) REGRESSED ON TEMPERATURE (X)

Descriptive Statistics

Variables	Sum	Mean	Variance	Std Deviation
X	1400	70	526.31578947	22.941573387
Y	40.9	2.045	0.6945736842	0.8334108736

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	12.83072	{edited out}	{edited out}	{edited out}
Error	18	{edited out}	{edited out}		
C Total	19	{edited out}			

Root MSE	0.14263	R-square	{edited out}
Dep Mean	2.04500	Adj R-sq	0.9707
C.V.	6.97454		

Parameter Estimates

Variable	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	-0.462400	0.10481069	-4.412	0.0003
X	0.035820	0.00142629	{edited out}	{edited out}

1. What is the value of R^2 (accurate to 2 decimal places)?

   A. 0.94
   B. 0.95
   C. 0.97
   D. 0.05

2. **Using only the statistics that are shown in the parameter estimates table:** What is the value of the test statistic for the t-test for the significance of the slope (accurate to 2 decimal places)?

   A. 630.71
   B. 25.11
   C. -4.41
   D. -0.46

3. What is the p-value for the overall F-test? Note: you are not required to use F-tables here.

   A. <0.05
   B. <0.01
   C. <0.005
   D. <0.001

4. **Using only use statistics that are shown in the parameter estimates table:** What is the test statistic value for the t-test for the significance of the correlation coefficient (accurate to 2 decimal places)?

   A. 630.71
   B. 25.11
   C. -4.41
   D. -0.46

5. A 95% interval for the average number of cells when temperature=50 (accurate to 2 decimal places) is:

   A. (1.24, 1.42)
   B. (1.24, 1.42)
   C. (1.24, 1.42)
   D. (1.24, 1.42)

(No, the above is not a mistake 😊. Your hand calculations should yield the answer shown above. If it does not, check in during office hours to figure out why!)