On the following tabs of this workbook you will find the 3 problems. Please work each problem on the assigned tab(s). For Problem 1, there is no separate data provided; please work in the tab where the problem is presented, placing any "scratch work", if needed, off to the right side. For problems 2 and 3 you are provided the data on a separate worksheet from the sheet where your answers are to be recorded; perform your calculations on either sheet but be sure to record your answers in the boxes provided on the "Problem 2" or "Problem 3" tabs.

Problem 1. This problem contains 3 parts (a. through c.) based on the following information.
Note that part c. does not depend on the answers to the previous parts.

A cordless telephone manufacturer is concerned about the quality of the keypads they are getting from an overseas supplier. Their customer service department records three categories of reasons why customers return a telephone: "Poor or no Connection", "Keypad Failure" or "Other". The company has reviewed a random sample of 300 telephone returns, from the past six months, to estimate the percentage of returns that were due to telephone keypad failures. The table below lists the counts for each reason in the **sample of 300** returns.

Return Reason	Quantity
Poor or No Connection	111
Keypad Failure	91
Other	98
Total	300

Note: There is NO data set in the file for this problem. Please show the formulae used to obtain each answer, not just the result;

Report all answers to this problem to a minimum of 4 decimal places.

Using this sample data, answer the following questions:

a. Construct the 95% confidence interval for the **population proportion** of returns that were due to "Keypad Failures". **Hint: first find the sample proportion of Keypad Failure returns. Then, using this sample proportion, proceed to determine the confidence interval.**

Upper Limit
Lower Limit

b. Describe in words what this 95% confidence interval means.

c. The phone manufacturer has a **separate** concern from looking at the **same sample data**. In the 5 years before this study, (before the past six months) the proportion of phone returns due to **"Poor or no connection"** had held steady at 33%. The proportion of returns for this reason now seems like it might now be **different from 33%,** based on this sample.

i. Give the **alternative** hypothesis statement for a test that could be carried out on this sample to answer this concern.

H_a: **(or H_1):** (Population Parameter) (Operator) (Null Value)

ii. What is the p-value for this hypothesis test?

The p-value for this hypothesis test is:

iii. Based on the answer to part ii (immediately above), should the phone maker conclude that the Poor or no connection proportion is now different than it had been in the 5 previous years? Yes or No? Explain your answer.

Problem 2 . This problem contains 4 parts (a. through d.) based on the following information.

A leading economist has gathered data on a number of developing countries. These data include Infant Mortality rates (**Mortality** – per 1000 live births), adult literacy index scores (**Literacy**) and an index score measuring the proportion of people completing primary school (**Education**). She is particularly interested in investigating factors that may impact infant mortality. **(This data is on the following tab)**

Report all answers to this problem to a minimum of 4 decimal places.

a. Run a multiple regression on this data. Use Infant **Mortality as the response variable** and the other two as explanatory variables. For each explanatory variable **(not for the constant**), write down the coefficient in the model and whether or not that coefficient is statistically significant using a **0.05 significance**.

Variable	Coefficient	Significant (Y/N)
Literacy Rate		
Education Rate		

b. Now, run the **regression** routine again, this time using **only** the explanatory variable(s) that had a significant variable coefficient in part a. above. Write the mathematical expression (**the model equation**) for the linear trend line.

Infant Mortality = _____ **+** _____ **x** **"Significant Exp Variable"** (either Literacy or Education)

c. How much of the variation in infant mortality is caused by the variation in the single significant explanatory variable:

Coefficient of Determination = _____

d. What would be the predicted infant mortality for a developing country with "**69**" as the value of the explanatory variable in your model in part b.:

Predicted Infant Mortality = _____

Data from developing countries

Country	Mortality	Literacy	Education
Cuba	18	98	98
Sri Lanka	20	85	92
Costa Rica	19	94	84
Vietnam	44	85	58
China	54	80	86
South Africa	56	68	76
Saudi Arabia	38	59	68
Brazil	60	78	56
Zimbawe	68	76	82
Morooco	68	42	76
Pakistan	98	36	38
Nigeria	86	44	56

Problem 3. This problem contains 4 parts (a. through d.) based on the following information.

The Florida Home Energy Commission lists the mean annual air-conditioning (A/C) expenditure for a well-insulated Central Florida home as $1.20 per square foot. Cool Crib Insulation (a home insulation company) is working hard to attract new customers. In the company's advertising, they claim that homes with their exclusive, patented insulation material have A/C costs that are below average for the region. A consumer-affairs investigator has surveyed a sample of 80 recent Cool Crib customers and listed their A/C expenditures (per square foot) in the following tab. The investigator is interested in examining whether the mean A/C expenditures for Cool Crib's clients really is less than the $1.20 per square foot average for the entire region. Based on these data, and **using a significance level of 5% (i.e.** $\alpha = .05$**)** provide the answers to the following questions in the spaces provided:

Report all answers to this problem to a minimum of 4 decimal places.

Using the provided sample data, answer the following questions:

a. Write the expression for the correct **alternative** hypothesis statement for the test that must be carried out.

Ha: (or H_1): [ ] [ ] [ ]

(Population Parameter) (Operator) (Null Value)

b. Perform the hypothesis test and record the "p-value" for this test.

The p-value for this hypothesis test is: [ ] 4 decimal places

c. Which of the following statements is correct?

i) i. The mean annual A/C expenditure for Cool Crib clients appears to be significantly less than the regional average of $1.20 per square foot.

ii) ii. The mean annual A/C expenditure for Cool Crib clients appears **NOT** to be significantly less than the regional average of $1.20 per square foot.

Copy and past your choice from the statements above into the yellow box below.

d. d. The investigator would next **(separately)** like to estimate, with 99% confidence, the mean annual A/C expenditures for all Cool Crib clients. Based on the same sample data (used in parts a. thru c. above), find the range in which he can be 99% confident that the actual mean annual A/C expenditures (for all Cool Crib clients) will fall?

Upper Limit	
Lower Limit	

	A	B	C	D	E	F	G
1							
2	**Annual A/C Expense**		**(per square foot) from sample of Cool Crib customers**				
3	1.14						
4	1.47						
5	1.49						
6	1.06						
7	0.83						
8	1.30						
9	0.98						
10	1.27						
11	1.25						
12	0.97						
13	0.94						
14	1.44						
15	0.87						
16	1.34						
17	0.99						
18	1.02						
19	1.04						
20	0.86						
21	1.23						
22	0.71						
23	1.51						
24	1.23						
25	1.38						
26	1.16						
27	1.23						
28	1.38						
29	1.00						
30	1.20						
31	1.52						
32	1.20						
33	1.07						
34	1.45						
35	1.00						
36	0.94						
37	0.89						
38	1.46						
39	1.32						
40	0.97						
41	0.94						
42	1.40						
43	1.13						
44	1.30						
45	1.11						
46	1.34						
47	0.75						
48	1.37						
49	1.01						
50	1.50						
51	1.18						

	A	B	C	D	E	F	G
52	1.06						
53	0.96						
54	1.13						
55	1.21						
56	1.29						
57	1.43						
58	1.38						
59	1.02						
60	1.27						
61	1.09						
62	1.56						
63	1.35						
64	1.26						
65	1.38						
66	0.98						
67	1.16						
68	1.19						
69	0.93						
70	1.56						
71	0.84						
72	0.80						
73	1.17						
74	1.33						
75	0.79						
76	1.10						
77	1.04						
78	1.05						
79	1.01						
80	1.05						
81	1.20						
82	0.91						