

**Instructions:** This exam is in two parts: Part I is to be completed partly at home using the materials posted on Blackboard for Part I and you will answer questions about that work in class below; Part II is to be completed entirely in class. You may not use cell phones, and you may only access internet resources you are specifically directed to use. You may access your data file for Part I of the exam in Blackboard. You may access the data files posted to Blackboard for the Exam part II. Be sure you are using the data file that matches the exam version you are given.

#### Part I: At Home

This part was completed at home. You can upload the Excel file for Part I to the Part I folder in Blackboard for use during the Exam period. However, this submission will not be graded in this location.

#### Part II: In Class

1. Use the work done at home to answer the Part I questions.
2. Open the file from the in-class portion of the final posted on Blackboard that corresponds to the version of the exam you have. This is Exam A.
3. Answer the questions corresponding to the data file, and any additional calculation in Excel required.
4. When you have finished answering questions on the exam, and all your answers have been recorded on the paper test for grading, upload both the take home Excel file and the in-class Excel file to the same in-class Exam folder in Blackboard for grading. Only those files submitted to the correct folder will be graded.
5. Turn in your paper copy of the exam to your instructor.
6. Enjoy your break!



Part I:

1. Is the model of units vs. Labor Hours linear or non-linear? Explain. Use the residual graphs in your explanation, and a discussion of the long-term trend in your explanation. [Hint: is there a point where the models may predict labor hours values that make no sense?] (10 points)
2. What is the equation and  $R^2$  value of the model that best fits the data. (8 points)
3. To what extent can you improve the model by removing the first value (a possible outlier)? Explain. (6 points)
4. Based on your analysis of the selling price of homes in the data set, which variables appear to have a negligible effect on the price? Explain your reasoning. (6 points)
5. Give the final regression equation produced from your analysis along with the  $R^2$  value. (8 points)

6. Based on your best equation, interpret the slope coefficient of the size variable in context. (6 points)

7. Interpret the  $R^2$  value obtained in context. (6 points)

8. For the data on property taxes by neighborhood, state the null and alternative hypotheses for this test, along with the test-statistic and P-value. What is the result of the test in context? (12 points)

9. Are all the assumptions of the ANOVA test satisfied? Explain. (6 points)

10. Using the information provided on the manufacture of chairs and tables, what is the maximum revenue the company can produce under these constraints? (6 points)

11. What production levels of chairs and tables will the company need to produce to obtain the maximum revenue? (6 points)

12. Describe the sensitivity of the model to modifying the amount of oak available (between 10,000 and 20,000 board feet). At what point does the production model substantially change? Explain. (12 points)

Calculations in Excel: (1) 20 points, (2) 40 points, (3) 25 points, (4) 25 points.

Part II:

13. Use the data provided on Cholesterol levels and exercise to conduct a two-sample T-test to determine if exercise reduces cholesterol levels. State the null and alternative hypothesis clearly. Is there enough evidence to support the conclusion that exercise reduces cholesterol? Is the test dependent or independent? (15 points)

14. The data file includes data on the proportion of employees for a particular company who exercised before a health and fitness center was installed in the office building, and afterwards. The company wants to determine if installing the fitness center changed the likelihood that employees were to exercise. Conduct a test of proportions, using the proportion from the "Before" condition as the null hypothesis for the "After" condition. What can you conclude? (15 points)

15. The data file contains data on the lifetime hours of batteries. Calculate a confidence interval for both sets of batteries. (6 points)

16. Based on the calculated confidence intervals, what conclusion can you come to about how the lifetimes of the batteries compare? (6 points)

17. Create a pivot table of Day of the Week vs. Time of Day for a sample of shoppers at a particular store. Conduct an appropriate test to determine if Time of Day is independent of Day of the Week. State the null and alternative hypothesis, test statistic and/or P-value, and the conclusions of the test in context. (15 points)

18. Explain the meaning of a Type I and Type II error on the context of the test in #17. (6 points)

Upload your completed Excel files to the Final Exam submission box in Blackboard, and submit your completed paper exam to your instructor. You may not modify anything once the exam is submitted.