

Note: Once you completed these questions using the built-in process under Data Analysis in Excel or Minitab 19 to support your results, you need to save the outputs of Excel as a picture and add it to your solutions in MS Word for each part of these Problems. Save all solutions as **one PDF file** and upload it in Moodle. As for the Minitab 19, simply copy the outputs and the plots into the same MS Word. Make only one PDF file and upload it using the dropbox of Moodle. *Please note that your uploaded PDF file must contain enough detailed for full mark.*

**Problem#1** All parts of this Problem must be done in Excel, only solutions by Excel will be given full mark.

To help consumers in purchasing a laptop computer, Consumer Reports calculates an overall test score for each computer tested based upon rating factors such as ergonomics, portability, performance, display, and battery life. Higher overall scores indicate better test results. The following data show the average retail price and the overall score for ten 13- inch models (Consumer Reports website, October 25, 2012).

Brand & Model	Price (\$)	Overall Score
Samsung Ultrabook NP900X3C-A01US	1250	83
Apple MacBook Air MC965LL/A	1300	83
Apple MacBook Air MD231LL/A	1200	82
HP ENVY 13-2050nr Spectre XT	950	79
Sony VAIO SVS13112FXB	800	77
Acer Aspire S5-391-9880 Ultrabook	1200	74
Apple MacBook Pro MD101LL/A	1200	74
Apple MacBook Pro MD313LL/A	1000	73
Dell Inspiron I13Z-6591SLV	700	67
Samsung NP535U3C-A01US	600	63

- Develop a scatter diagram with price as the independent variable.
- What does the scatter diagram developed in part (a) indicate about the relationship between the two variables?
- Use the Least Squares method to develop the estimated regression equation.
- Provide an interpretation of the slope of the estimated regression equation.
- Another laptop that Consumer Reports tested is the Acer Aspire S3-951-6646 Ultrabook; the price for this laptop was \$700. Predict the overall score for this laptop using the estimated regression equation developed in part (c).

**Problem#2** All parts of this Problem must be done in Excel, only solutions by Excel will be given full mark. Of course you save the Excel output as a picture and added to your word document, then make it as a PDF file.

The Dow Jones Industrial Average (DJIA) and the Standard & Poor's 500 (S&P 500) indexes are used as measures of overall movement in the stock market. The DJIA is based on the price movements of 30 large companies; the S&P 500 is an index composed of 500 stocks. Some say the S&P 500 is a better measure of stock market performance because it is broader based. The closing price for the DJIA and the S&P 500 for 15 weeks, beginning with January 6, 2012, follow (Barron's website, April 17, 2012).

Date	DJIA	S&P
January 6	12360	1278
January 13	12422	1289
January 20	12720	1315
January 27	12660	1316
February 3	12862	1345
February 10	12801	1343
February 17	12950	1362
February 24	12983	1366
March 2	12978	1370
March 9	12922	1371
March 16	13233	1404
March 23	13081	1397
March 30	13212	1408
April 5	13060	1398
April 13	12850	1370

- Develop a scatter diagram with DJIA as the independent variable.
- Develop the estimated regression equation.
- Test for a significant relationship. Use  $\alpha=0.05$ .
- Did the estimated regression equation provide a good fit? Explain.
- Suppose that the closing price for the DJIA is 13,500. Predict the closing price for the S&P 500.
- Should we be concerned that the DJIA value of 13,500 used to predict the S&P 500 value in part (e) is beyond the range of the data used to develop the estimated regression equation?
- Add a note on your potential leverages, outliers, and influential observations.

**Problem#3**

All parts of this Problem must be done in Excel and then converted into the PDF file.

PC Magazine provided ratings for several characteristics of computer monitors, including an overall rating (PC Magazine website, April, 2015). The following data show the rating for contrast ratio, resolution, and the overall rating for ten monitors tested using a 0–100 point scale. The highest rated monitor was the BenQ BL3201PH, with an overall rating of 87.

Model	Contrast Ratio	Resolution	Overall Rating
BenQ BL3201PH	78	89	87
AOC U2868PQU	98	87	86
NEC MultiSync PA322UHD	84	82	85
Acer XB280HK	78	79	82
Asus ROG Swift PG278Q	65	80	82
AOC E1759Fwu	57	78	82
Dell UltraSharp UZ2715H	56	83	80
NEC MultiSync EA244UHD	77	72	79
HP DreamColor Z27x	47	81	78
Dell UltraSharp UZ2315H	55	70	76

- Develop the estimated regression equation that can be used to predict the Overall Rating using the Contrast Ratio Rating. Add a plot that shows the estimated line along with all the sample data.
- Predict the Overall Rating for a computer monitor computer that has a Contrast Ratio Rating of 85.
- Use Minitab 19® to create both *Confidence Interval* and *Prediction Interval* plots, and provide the lower limits and upper limits of both C.I. and P.I. Clearly, distinguish between these two predictions.
- Develop the estimated regression equation that can be used to predict the Overall Rating using both the Contrast Ratio Rating and the Resolution Rating.
- Predict the Overall Rating for a computer monitor computer that has a Contrast Ratio Rating of 85 and a Resolution Rating of 74.
- Compare and contrast your findings in part (b) and (e), any comments?

**Problem #4** Some parts of this Problem must be done in Excel some in Minitab 19

The manager of a retailer has been experiencing quite a few online “order errors” (i.e. retrieving the wrong item). A training program then introduced as the manger believes the source of these errors are due to being as an inexperienced workers who have never attended an on-job training session. The 37 collected randomly selected sample data in the excel file are provided with number of errors, whether the worker attended a training sessions (train=1, otherwise=0), years of experiences.

- a) Estimate two linear regression models - one with experience and training as independent variables, and another one with an extra feature for the *interaction* between experience and training. Both models come with an intercept. You can use basic excel (Data Analysis adds-in) or Minitab 19 for this part.
- b) Comments on coefficient of determination, and the significance of the estimated coefficients of both models.
- c) Clearly explain- in a nontechnical language- the followings:
- d) Significance or insignificance of the *interaction* term estimated in part (a).
- e) Interpretation of the estimated coefficients of both models.
- f) Report which model your group will go with for predicting the errors, and why?
- g) Use the selected model in part (d), and *predict* the number of errors for an employee with 20 years of experience who attended the training session as well as for an employee with 20 years of experiences who did not attend the session. Any comments? [No need to use Minitab 19 for this part].
- h) Discuss any potential influential observations for both of the estimated models.
- i) List some other potential features may have impact on the errors made by workers of this retailer, and explain how you would collect data for these potential extra features.

