UvaWellassa University, Sri Lanka
End Semester Examination-February/March, 2012
SCT 401-1 Data Handling and Statistics
Time: Three (03) hours

Uva Wellassa University

Answer all questions.
Total Three (03) pages.

1. A market research consultant hired by the Elephant House Co. is interested in determining, whether there is a difference between the proportions of male and female consumers who favour KIK-Cola in a particular urban location. A random sample of 250 consumers from the market was under investigation and the recorded data are stored in ***Cola.mtw*** Minitab worksheet.

   I. Construct a 95% confidence interval for the difference between the proportions of male and female consumers who favour KIK-Cola? Comment on the result.

   II. The marketing manager of Elephant House Co. asked the market research consultant to explore further the potential differences in the proportions of males and females who prefer drinking KIK-Cola varies by the age of the consumers. Age is given under four categories: under 20, between 20 and 40, between 40 and 60, and over 60. Using the same data file used in part (I), assess whether there is an association between gender and the age groups.

   III. If you are the market research consultant, what recommendations would you make to the marketing manager from your statistical findings?

[30 marks]

2. The titanium content in an aircraft-grade alloy is an important determinant of strength. An aircraft manufacturer needs to buy this alloy with median titanium content of 8.5%. A sample of 10 test coupons reveals the following titanium contents (in percent):

   8.32, 8.05, 8.93, 8.65, 8.25, 8.46, 8.52, 8.35, 8.36, 8.41

   I. Based on the results of an appropriate hypothesis test, decide whether the manufacturer should buy this alloy? Explain your answer.

   II. Use the normal approximation for the above data. What should be the manufacture's decision?
   (Use α=0.05)

[20 marks]

3. Pinot Noir wine is among the most popular in the world. The quality of Pinot Noir wine is thought to be related to the properties of clarity, aroma, body, flavor and oakiness. The ***Wine.mtw*** Minitab worksheet presents data on taste-testing 38 brands of Pinot Noir wine.

   I. Use the data to fit a model for predicting the quality of Pinot Noir wine from the other variables.
   II. Evaluate the model assumptions using residuals.
   III. Test for significance of the model. What conclusions can you draw?
   IV. Assess the contribution of each predictor to the model. Discuss your findings.
   V. Write a suitable model to predict the quality of Pinot Noir wine from Region 2.
   VI. Explore how model selection procedures are performed for these data. Do they lead to the same final model as your analysis?
   (Use α=0.05)

[25 marks]

4. Before new drugs are given to humans, it is common practice to test them first in dogs or other animals. In part of one study, a new drug under investigation was given to 4 male and 4 female dogs, at doses 8mg and 25mg. Alkaline phosphatase level (measured in U/Li) was measured from blood samples in order to screen for toxicity problems in dogs before starting with humans. The design of this experiment allows for the investigation of the interaction of two factors: sex of the dog and dose. Data are shown in the following table.

Dose	Male	Female
8mg	191	150
	154	127
	194	152
	183	105
25mg	80	141
	49	153
	78	171
	71	197

I. Check for the adequacy of assumptions; the constant variance and normality using relevant graphical summary.

II. Using a suitable analysis along with effect plots answer the following questions.

a) Is there any interaction between the factors?

b) What is the best dose for the male dogs?
(Use α=0.05).

[25 marks]