**Indian Institute of Management Bangalore  
Postgraduate Programme in Management  
Batch 2018-20  
Decision Sciences I   
Assignment**

**Submission Deadline: 7 September, 2018**

**Maximum Marks: 100**

**Instructions: Please provide adequate reasoning, including calculations and graphs, if any, in support of your answers. State any assumptions made for answering the questions.**

**Question A**

1. Draw 200 random samples each of size 80 from a normal distribution with mean 3 and variance 9.
2. Write down the distribution of the sample mean. Test using the data obtained above, if the sample means follow that distribution.
3. Draw 200 random samples each of size 90 from a normal distribution with mean 6 and variance 9.
4. Test using the data obtained above in 1) and 3), if the difference in sample means follow normal distribution.
5. Compute 95% confidence interval for the difference of means from each of the 200 samples. Draw a graph to show all 200 confidence intervals and comment.

**Question B**

Collect weekly price of any stock of your choice from the Indian stock market for last three years, and the NIFTY INDEX vales for the corresponding weeks to answer the following questions:

1. First, compute the weekly changes in the price (PC ) of the selected stock as well as in the nifty index values (IC).
2. Classify each of PC and IC in three suitable ranges (calling them Low, Medium and High) and then construct a two-way table.
3. Given that IC is high, what is the probability that PC is low?
4. Are PC and IC independent?
5. Test if the average weekly PC is at least 0.5%.
6. Test if 90% of the weeks have ICs more than 0.5%.
7. Test if the variation in weekly IC is at most 1%.
8. Are the weekly PC averages across high and low IC equal?
9. Is the variation of weekly PC when IC is low same as that of IC when it is high?
10. Test if the proportion of weeks with more than 0.5% PC is same when IC is medium or low.
11. Test if the weekly PC averages across three classifications of IC are equal.
12. Find the correlation between PC and IC for the whole sample and also separately for each combination of PC and IC classification. What can you say about the relation?
13. Find a 95% confidence interval for average PC.
14. Find a 95% confidence interval for proportion of weeks with more than 0.5% PC.
15. Summarize all the results.

**Question C**

1. Let the number of customers arriving at a Mustard Caffe follow Poisson distribution with mean 5 per half an hour. Generate 500 samples each of sample size 100 from Poisson (5).
2. Find the sample mean for each sample generated.
3. Plot the histogram of the sample averages.
4. Calculate of mean and variance of the sample average.
5. Fit a normal distribution with an appropriate mean and variance on the sample averages. Test the goodness of fit.
6. Comment on the results.
7. A company employs people in the aged group 25 - 50 who are distributed as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 25-30 | 30-35 | 35-40 | 40-45 | 45-50 |
| 0.3 | 0.1 | 0.4 | 0.1 | 0.1 |

Draw 400 random samples each of size 150.

1. Sketch the distribution of the sample average age.
2. Fit a normal distribution with an appropriate mean and variance on the sample averages. Test the goodness of fit.