



STRATHMORE UNIVERSITY
JAN-APRIL 2020: END OF SEMESTER EXAMINATION
STA 8101: OBJECT-ORIENTED PROGRAMMING WITH APPLICATION
IN FINANCE

Date: Monday, 31st August, 2020. Time: 4 hours

Instruction: Answer Question one and any other two. Use R and attach all R scripts and output

Question 1

- a) Under S3 Object-oriented Programming in R, discuss the difference between straight forward approach and local environment approach
(4 marks)
- b) An S3 class is (most often) a list with a class attribute, can be constructed by the code class(obj). Use the environment in R to generate the following distribution of size 500
- i. Dat1=Normal distribution with mean=9 and s.d=5
 - ii. Dat2=Poisson distribution with lambda=10
 - iii. Plot Dat1 and Dat2
 - iv. Determine the class of Dat1 and Dat2

(8 marks)

- c) Given the formulae for Present Value of Annuity:

$$PV = P \times \frac{1 - (1 + r)^{-n}}{r}$$

P is the value of each payment

r is the interest rate per period, as a decimal, so 10% is 0.10

n is the number of periods

Use the R function on S3 environment and provide the codes

(3 marks)

- d) Using the OOP_CashFlow Data provided, pull out each county and show the spread of Credit_level and CashFlow_Level in reach county. I.e. Mombasa county will generate two maps of Mombasa; one that shows Credit_level and another CashFlow_Level.

(15 marks)

Question 2

Using Dataset3 provided. The excel spreadsheet has 3 different dataset in different sheets i.e. Profit, Expenses and Acquisitions.

- i. Using R with inner-join function merge the three datasets to form a master file
- ii. Drop the column area from the master file.
- iii. Fit all variables in a typical linear regression and interpret your results
- iv. Perform model selection using step function and interpret your results

(15 marks)

Question 3

Given OOP_Data5 provided. The dataset compose of 4 different sets.

- a) Do a inner_merge in order to generate a master file with all variables
- b) Clean the data and import it to R (By cleaning, I mean convert qualitative variables to numerical categorical
- c) Fit the 3 Penalized logistic regression using defaulters as response variable
- d) Compare the three results using AIC and BIC where appropriate

(15 marks)

Question 4

Given any annuity function, provide the R scripts that can be utilized to compute

- a) Term of an ordinary annuity
- b) Future value of an annuity due
- c) Current value of an annuity due
- d) Payment of an annuity due
- e) Payment of an annuity due

(15 marks)

Question 5

Describe the following useful S3 Method Functions

- a) `methods("print")`
- b) `getS3method("print", "person")`
- c) `plot.ecdf`
- d) `plot.default`
- e) `getS3method("plot", "histogram")`

(15 marks)