SYSC 4106 – Winter 2020 - Case Study Assignment 3 → 50 marks (5% of the final grade)

→ Posted = March 10, 2020 Due = March 26, 2020 @ 11:55 pm on cuLearn

Note: Use the same "reading/writing project" subgroup members for this case study

Question 1[1+4+1 = 6 marks]

Table 1 below shows cash projections for a software project. The figures are end-of-year totals in Canadian dollars. The year 0 figure represents the initial investment made at the start of the project.

Table 1

Year	Project 1 cash flow ($)	Discount factor @ 8%	Discounted cash flow
0	-100,000	1.0000	-100,000
1	10,000		
2	10,000		
3	10,000		
4	20,000		
5	100,000		
Net profit	50,000		NPV =

a. What is the ROI for the project?
b. Using the table complete the discounted factor @ 8% and the discounted cash flow.
c. Using the table, what is the NPV for the project?

Question 2 [3+3+3+3+3 = 15 marks]

Xenon Software is bidding on three separate projects, P1, P2, and P3. They know that they will win exactly one of those projects, but they do not know which one. They also have no idea which of the projects is more likely. They need to buy some computer equipment to support the projects. The equipment choices, C1 through C4, are mutually exclusive; Xenon can only buy one of them. Due to lead times in purchasing, they need to buy the equipment before any contract is awarded. Unfortunately, certain choices of equipment are better suited to some projects than others. The following payoff matrix shows the net profit (in $1000s) for the various choices of computer equipment under each of the projects.

Equipment	P1	P2	P3
C1	100	90	60
C2	30	30	140
C3	70	80	90
C4	100	20	120

a. What equipment would be purchased based on the Laplace rule?
b. What equipment would be purchased based on the Maximin rule?
c. What equipment would be purchased based on the Maximax rule?
d. What equipment would be purchased based on the Hurwicz rule with $\alpha = 0.3$?
e. What equipment would be purchased based on the Minimax regret rule?

Please, show all your work and the different tables.

Question 3 [3+3+2 = 8 marks]

A software organization has a choice between two data processing routines. The number of records in the input stream determines the performance of the two routines. Analysis has shown that the performances of the two routines are:

- *Routine 1* → $t = 7.5s^2 - 570s + 12112$
- *Routine 2* → $t = 4s^2 - 384s + 9621$

Where t is the execution time (in milliseconds) and s is the number of records in the input stream. To get the best overall optimal performance, which routine should be selected, and what should be the size of the input stream?

Please show details of your work!

Question 4 [3+2+5+1+2+2+5+1 = 21 marks]

Components	Defects	mR
1	12	
2	16	
3	18	
4	32	
5	22	
6	16	
7	23	
8	35	
9	15	
10	27	
11	16	
12	25	
13	20	
14	26	
15	20	
16	23	
17	23	
18	36	
19	22	
20	27	
21	17	
Average	Am =	mR=

The table [beside] shows disaggregated data of design inspections for 21 components of a software system. The table shows the number of defects found during design inspections for each of 21 components of the new system. Each component is believed to possess the same area of opportunity in terms of the potential for defects to occur and be found.

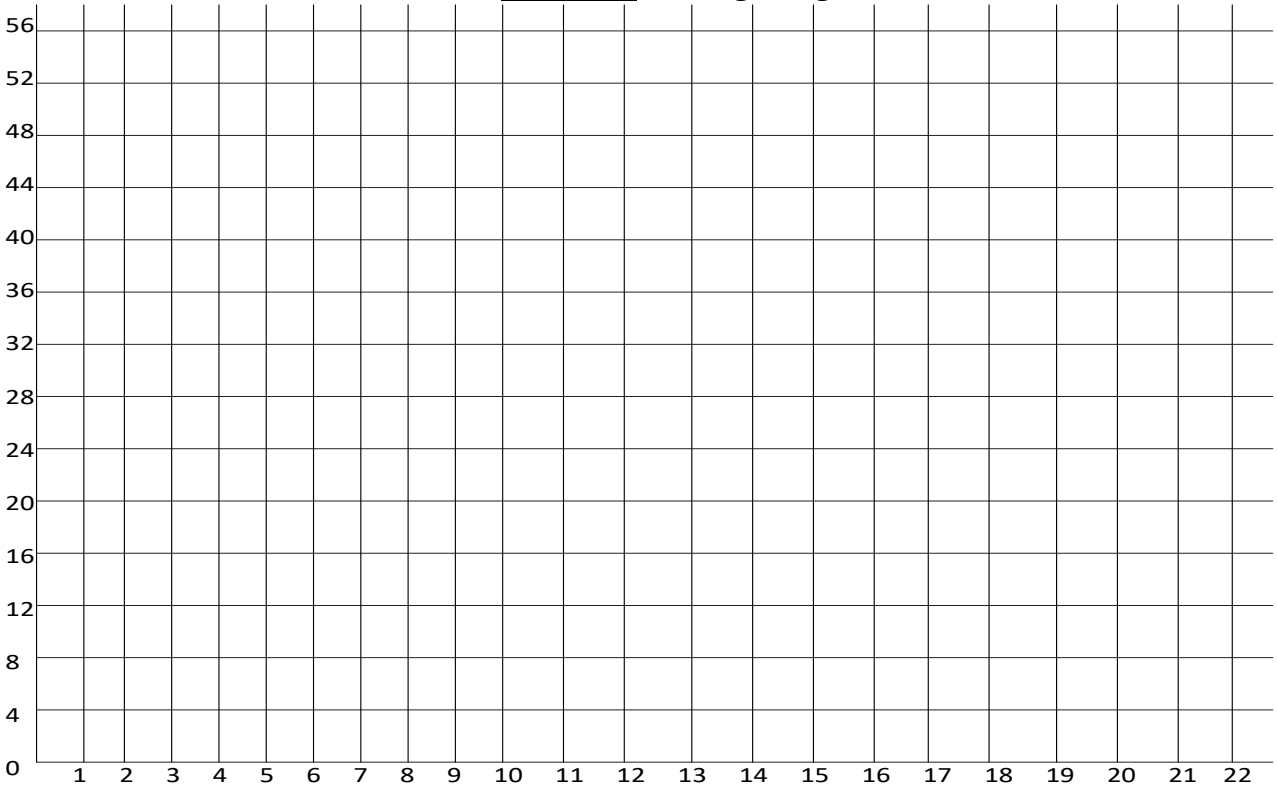
(a) Using the table, complete the mR values, Am and average mR

(b) Calculate the UCL (Upper Control Limit). **Show your calculation**

Note: You do not have to use my graphs. You can generate your own using spread sheets

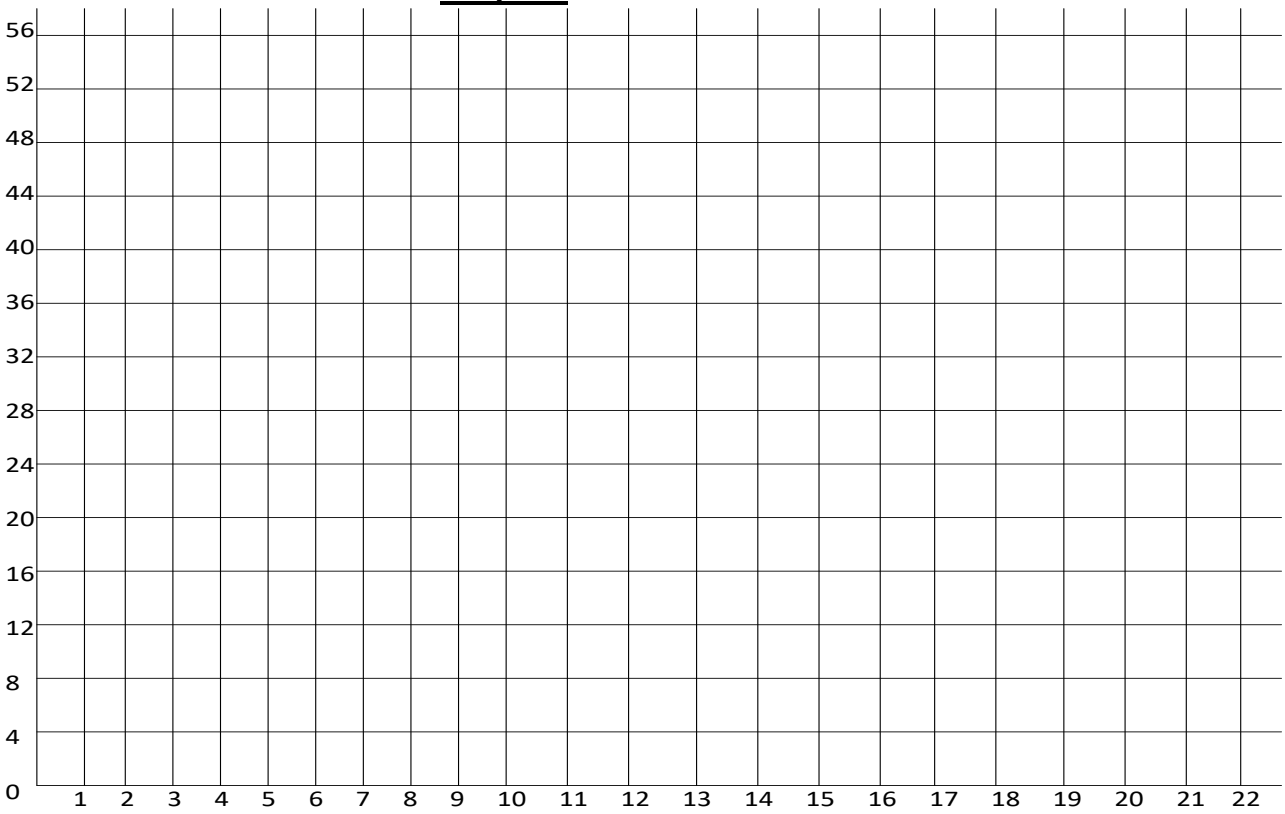
(c) Plot a moving range (mR) chart for the data using Graph-1.

Graph -1: Moving Range



d. Is the data dispersion stable and why?
e. Calculate the UNPL (Upper Natural Process Limit). **Show your calculation**
f. Calculate the LNPL (Lower Natural Process Limit) **Show your calculation**
g. Create an individual control chart using Graph-2.

Graph-2: Individual control chart



h. Is the data dispersion capable and why?