COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NMMS204: QUANTITATIVE METHODS 2

END OF SECOND SEMESTER EXAMINATIONS

MAY 2021

LECTURER: TARAMBAWAMWE P

DURATION: 7 HOURS

INSTRUCTIONS

You are required to answer only ONE question.

Credit will be awarded for logical, systematic and neat presentations

Q1 a

I got the quarterly figures of salesmen's performance through yesterday and I thought I'd see if there is any connection between how far they travel and how many sales they make, so I put them through our computer package that does correlations, but I can't make sense of the bits at all- could you interpret, please.'
The information enclosed with the memo is as follows:

Salesman	**Mileage(km)**	**No. of Sales**	**Time with Company(Months)**
Smith	256	27	32
Adams	462	8	6
Williams	322	34	36
Green	211	25	28
Murphy	153	18	8
Evans	186	23	12
Newton	372	38	50
Sam	223	19	12

Regression equation for no. of sales on time with company is Y = 11.35 + 5.5X
Correlation coefficient: mileage and no. of sales = - 3. Regression equation for no. of sales on mileage is:
Y = 24.72 -4X

i. Write notes to guide you in explaining to the sales manager what this information means, and how it should be interpreted in the light of the data. [10]

ii. Calculate the coefficient of determination of the time with the company and number of sales and interpret it [6]

Q1b

i. Construct the network for the following project, number the nodes, starting at one. [8]

Activities:
A is the first activity in the project
B starts when A is complete
C follows B
D starts at the same time as B
E follows all other jobs.

ii. Using the following activity timings, add the EST and LFT for each node and determine the critical path for this project. [6]

Activity	A	B	C	D	E
Duration (days)	2	5	3	2	6

Q1c.i

How many five digit number divisible by 3 can be formed using the numerals 0, 1, 2, 3, 4 and 5. [5]

ii. Suppose a licence plate contains 3 letters followed by 4 digits with the first digit not zero. How many different licence plates can be printed? Assume there are 52 letters in the alphabet[5]

iii. A ball is dropped from a height of 6 metres onto a hard floor and bounces. After each bounce, the maximum height reached by the ball is 60% of the pervious maximum height. What is the total distance travelled by the ball from the time it was first dropped until it eventually comes to rest on the floor[5]

1d. Comment on the statement that ”Index numbers are fraught with arbitraries” [5]

Q2 a

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Correlation coefficient: mileage and no. of sales = - 3. Regression equation for no. of sales on mileage is:
Y = 24.72 -4X

i. Write notes to guide you in explaining to the sales manager what this information means, and how it should be interpreted in the light of the data. [10]

ii.Calculate the coefficient of determination of the time with the company and number of sales and interpret it [6]

2b [9]

Given the activities of a project below

A is the start of the project
B and E can start when A is complete
C follows B
F and G can start when E is complete
D cannot start before C and F are complete and must finish before J can start
J also depends on the completion of G before it can start.

i. Draw a network using the information:
ii. Number the nodes, starting at one.
iii. Using the activity timings below, add the EST and LFT for each node.
iv. Calculate the free and total floats for the project and identify the critical path through the diagram.

Activity	A	B	C	D	E	F	G	J
Duration (days)		3	3	6	4	3	5	

2c i. John inherited $25,000 and invested part of it in a money market account, part in municipal bonds, and part in a mutual fund. After one year, he received a total of $1,620 in simple interest from the three investments. The money market paid 6% annually, the bonds paid 7% annually, and the mutually fund paid 8% annually. There was $6,000 more invested in the bonds than the mutual funds. Find the amount John invested in each category. [5]

Qc ii. Tich decides to set up a trust fund for her grandson, Tichafa. She invests $160 at the beginning of each month. The money is invested at 5% per annum compounded monthly. The trust fund matures at the end of the month of her final investment, 25 years after her first investment. This means that Betty makes 300 monthly investments.

1. After 25 years, what will be the value of the first $160 invested? [3]

2. By writing a geometric series for the value of all Tich investments, Calculate the final value of Tichafa's trust fund. [3]

d. i. How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 3 [3]

d.ii Find the number of ways in which a team of 7 players can be selected from 20 players including 3 of them and excluding 5 of them [3]

dii. Ramesh has 6 friends. In how many ways can he invite at least three of them at a dinner if Lameck has to be excluded all the time. [3]

e. Comment on the statement that "Index numbers are fraught with arbitraries" [5]

Q3

(a) An arithmetic progression has first term $\log_2 27$ and common difference $\log_2 x$.

(i) Show that the fourth term can be written as $\log_2 (27x^3)$. **[3]**

(ii) Given that the fourth term is 6, find the exact value of x. **[2]**

(b) A geometric progression has first term $\log_2 27$ and common ratio $\log_2 y$.

(i) Find the set of values of y for which the geometric progression has a sum to infinity. **[2]**

(ii) Find the exact value of y for which the sum to infinity of the geometric progression is 3. **[5]**

(c) i. How many terms in the GP 4, 3.6, 3.24, . . . are needed so that the sum exceeds 35? [5]

ii.Find the sum of the terms in the GP 4, 3.6, 3.24, . . . [3]

iii.. How many different committees of 5 can be formed from 6 men and 4 women on which there is at least one men and at least 2 women serve ? [5]

iv. Ramesh has 6 friends. In how many ways can he invite one or more of them at a dinner if Lameck has to be there all the time. [5]

d.

I got the quarterly figures of salesmen's performance through yesterday and I thought I'd see if there is any connection between how far they travel and how many sales they make, so I put them through our computer package that does correlations, but I can't make sense of the bits at all- could you interpret, please.'
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i. Write notes to guide you in explaining to the sales manager what this information means, and how it should be interpreted in the light of the data. [10]

ii. Calculate the coefficient of determination of the time with the company and number of sales and interpret it [6]

e. i. In your construction project, there are five activities left; Activity A has a duration of 2 weeks and it is the finish-to-start predecessor of Activities B, C and D. Activity B will take 1 week to complete, Activity C has a duration of 2 weeks and Activity D is 3 week long. On the other hand, Activity E is dependent upon de completion of activities B, C and D. Which activities are the critical path? [4]

ii. Comment on the statement that ”Index numbers are fraught with arbitraries” [5]

END OF EXAMINATION……..