CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTERS OF ARTS IN GEOGRAPHY

GEOG 833: ADVANCED QUANTITATIVE METHODS

STREAMS: MA (GEOG) **TIME: 3 HOURS**

DAY/DATE: TUESDAY 14/04/2020 **8.30 AM – 11.30 AM**

INSTRUCTIONS:

Answer Question One and any other Three Questions

1. (a) Define statistical hypothesis testing. [2 marks]

   (b) Differentiate between the following terminologies:

   (i) Eigen vector and Eigen value [2 marks]
   (ii) Covariance and variance [2 marks]

   (c) Solve the following system of linear equations using the Cramer's rule. [5 marks]

   (d) Explain any four assumptions of a two-way ANOVA. [4 marks]

2. (a) A study was conducted to find out the type of relationship between human geography and quantitative methods in Geography scores for geography students. The results are displayed in the table below

Student	Human geography score	Quantitative method in geography score
1.	84	69
2.	74	64
3.	48	56
4.	54	72
5.	72	85
6.	71	68
7.	96	87

8.	75	71
9.	69	91
10.	100	31
11.	23	65
12.	58	89
13.	94	71
14.	76	54
15.	52	66
16.	61	78
17.	77	97
18.	98	84
19.	83	71
20.	77	

(i) Use Pearson's Product Moment Correlation to compute correlation between the two sets of scores. [7 marks]

(ii) Work out the coefficient of determination and explain its significance [2 marks]

(b) Suppose you computed r=-0.624 with 14 data points, test significance of the correlation coefficient. [6 marks]

3. In an experiment to determine the relationship between packed cell volume and red blood cell count of 10 dogs, the following results were obtained:

Packed cell volume (mm) X	45	42	56	48	42	35	58	40	39	50
Red blood cell count (millions) Y	6.53	6.3	9.52	7.5	6.99	5.9	9.49	6.2	6.55	8.72

(a) Find the equation of regression line on Y on X [3 marks]
(b) Draw the scatter diagram and graph the line. [3 marks]
(c) Use the line to estimate Y when X=37 [3 marks]
(d) calculate the correlation coefficient [3 marks]
(e) Test the significance of the correlation coefficient [3 marks]

4. Consider the following data from an experiment of five samples with four variates each

A	B	C	D	E
10	12	9	11	10
4	10	4	9	6
6	13	4	10	8
4	7	5	11	4

Based pm the 5% level of significance, are there significant differences between the means of the five samples given the table below [15 marks]

5. The following data gives the number of hired workers in a company in thousands

Year	Jan	Feb	mar	April	may	June	July	Aug	Sept	Oct	Nov	Dec
1939	156	156	158	198	205	237	260	317	380	255	210	165
1940	146	157	159	202	227	232	283	260	345	340	195	151
1941	134	143	154	170	203	275	368	413	430	361	294	231
1942	160	162	172	171	210	244	374	394	476	339	332	236
1943	153	161	167	185	209	269	356	404	474	350	309	243
1944	165	178	184	185	207	285	359	385	460	349	315	236
1945	174	179	179	188	211	263	364	417	501	336	341	224
1946	176	174	172	188	240	290	388	422	468	357	343	248
1947	188	190	201	200	236	313	418	432	453	387	339	249
1948	196	187	183	205	239	306	388	436	484	436	373	250

(a) Express the data as yearly time series and find the corresponding equation of the trend line. [5 marks]

(b) Graph the trend line by the method of least of squares [5 marks]

(c) Find the trend value for each of the years listed. [5 marks]

6. (a) Use matrices to solve the simultaneous equations:

$x - -y + 5$

$-2x + 2z = y - 10$

$3x + 6y + 7z = 14$

Calculate the covariance matrix for this 3-dimensional set of data [8 marks]

Item number	1	2	3
x	-	-1	4
y	2	1	3
z	1	3	-1
