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FACULTY OF SOCIAL SCIENCES/ MANAGEMENT SCIENCES
DEPARTMENT OF GEOGRAPHY/ TRANSPORT MANAGEMENT
2017/2018 HARMATTAN SEMESTER EXAMINATION

COURSE CODE: GRP 401/ TLM 407
COURSE TITLE: QUANTITATIVE TECHNIQUES IN GEOGRAPHY AND TRANSPORT
INSTRUCTION: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS
TIME ALLOWED: TWO HOURS

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1. The manager of a transport company obtained data on the fleet of vehicles and revenue of his company between 2007 and 2016 as shown in Table 1 below.

Table 1:

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicles (x)	150	165	201	243	250	212	253	301	352	402
Revenue (in million Naira) (y)	30	31	42	45	50	44	47	53	58	61

(i) Calculate the Product Moment Correlation coefficient for the bivariate distribution in Table 1
(ii) Using the result in (i) above, test the hypothesis that there is no correlation between revenue generated and the fleet of vehicles at 0.05 significant level (Critical value from Student's t-table at 5% level and 8 degrees of freedom = **2.306**)
(iii) Develop the estimating equation to predict revenue (y) from fleet of vehicles (x)
(iv) Predict revenue for fleet of vehicles = 350; 480 and 720
(v) Interprete the regression coefficient (**b**) of the estimating equation
(vi) Discuss any three of the assumptions to be considered in carrying out a regression analysis

2. The data in Table 2 shows the casualties in road accident in ten randomly selected towns of two local government areas.

Table 2:

Town Id.	1	2	3	4	5	6	7	8	9	10
Local Govt. A	52	34	40	41	50	28	18	30	25	14
Local Govt. B	10	16	39	47	28	51	25	39	18	15

(i) Using Student's t-test, examine the hypothesis that road accidents are the same (at 5% significance level) in the two local government areas (critical t-value at 5% level and 18 degrees of freedom = **2.10**).
(ii) What is meant by degrees of freedom in hypothesis testing?
(iii) Explain the random sampling method

3. Table 3 is a contingency table of marital status of commuters in Lagos state and their view on the convenience of BRT service.

Table 3:

		Convenience of BRT Service	
		Convenient	**Not convenient**
Marital status	**Single**	35	15
	Married	20	30

(i) Use the Chi-square analysis to examine the hypothesis that marital status of commuters determines their view on convenience of BRT service (Critical χ value at 5% level and one degree of freedom = **3.841**)

(ii) What are type I and type II errors in hypothesis testing
(iii) What is the difference between descriptive and inferential statistics.

4. Ten countries were randomly selected and ranked according to their performance on rail connectivity and per capital income as shown in Table 4.

Table 4:

Country Id.	1	2	3	4	5	6	7	8	9	10
Rank of rail connectivity (Beta index)	8	3	9	2	7	10	4	6	1	5
Rank of per capital income (S'000)	9	5	10	1	8	7	3	4	2	6

(i) Using the Spearman's rank correlation coefficient, determine the nature of the relationship between rail connectivity and per capital income.
(ii) Does correlation imply causality? Discuss.
(iii) What is the difference between correlation and regression analysis?

5. Table 5 shows the identification of primary health care facilities (PHC) and their nearest neighbour in Ijebu North local government area of Ogun state. The land size is 164 sq. km.

Table 5:

PHC Id.	1	2	3	4	5	6	7	8	9	10
Nearest Neighbour Id.	3	3	1	5	6	5	9	1	7	7
Distance (in km.)	1.5	1.3	1.5	2.2	1.8	2.7	2.4	2.7	1.8	3.0

(i) Compute the Nearest Neighbour Statistic
(ii) Determine the pattern of the distribution
(iii) Why do we take samples in social survey?

6. The data given in Table 6 represents the income (in ₦'000) of ten randomly selected drivers in three transport companies.

Table 6:

Company A	13	11	17	19	16	15	12	13	14	11
Company B	15	10	12	11	10	9	10	12	11	9
Company C	20	18	14	22	16	14	10	9	12	13

(i) Use the one way analysis of variance (ANOVA) to test the hypothesis that there is no significant difference in income paid across the three transport companies at 5% level (critical F-value at 5% level: $F^2_{27} = 3.35$)

(ii) Briefly describe the four scales of data measurement.