

THE UNIVERSITY OF ZAMBIA
SCHOOL OF HUMANITIES AND SOCIAL SCIENCES
2015 ACADEMIC YEAR FINAL EXAMINATIONS

DEM 2414: RESEARCH AND STATISTICAL METHODS IN DEMOGRAPHY

TIME: THREE HOURS

INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTIONS A AND C; ONE QUESTION EACH FROM SECTIONS B AND D.

] **SECTION A**

ANSWER ALL QUESTIONS IN THIS SECTION. THIS SECTION CARRIES 30 PERCENT.

1. In framing questions for research, certain pitfalls have to be avoided. Identify the pitfalls in the questions below:
 - a) You don't think the government is fighting inflation strongly, don't you?
 - b) Do you watch cinemas and play video games in your spare time?
 - c) Are you of the view that diminishing returns in agriculture account for the exponential decline in Zambia's gross national product?
 - d) Are you in support of the gross abuse of human rights by the current regime?
 - e) Do you participate in sports because you are fit?

2. Define or explain the terms below making sure you also give the formulas where required in each case:
 - a) Sampling fraction
 - b) Sampling interval
 - d) Verstehen
 - e) The Hawthorne effect

3. Indicate what sorts of questions are being referred to here:
 - a) A question used when respondents are asked to make a judgment in terms of sets of ordered categories, reflecting the intensity of judgment involved.
 - b) A question with predetermined options to choose from.
 - c) A question asked depending on the response to the preceding question
 - d) A method of organizing a large set of questions that have the same responses
 - e) A question that applies only to a segment of the sample.
 - f) A question without predetermined categories to choose from.

4. For the statements below, indicate whether they represent qualitative or quantitative research techniques:
 - a) A researcher uses focus group discussion in attempting to understand the patterns of social relationships among kaonyas at KMB Bus Stop. He then writes a report in which he quotes them extensively in their own words.
 - b) Another researcher studies the ngw'ang'wazi using a questionnaire to collect his data. After this, he feeds the data into a computer and prints out a frequency distribution of their socio-economic and demographic characteristics.

- c) Of the methods above, which one are you expected to use in Department of Population Studies?
5. Indicate what the flaws are with the following questions in a questionnaire:
- Do you accept the unimaginative way the university administration is handling student affairs?
 - Are you cognizant of the dysfunctional aspects of the registration exercise at the beginning of each semester?
 - Do you favour the abolition of free education and the reduction student allowances at CBU?
 - Do you oppose the administration's handling of student affairs because they are unfair?
 - Are you not of the view that the administration should change its attitude towards the workers' welfare?
 - Do you smoke marijuana?
6. Researchers use both open-ended and closed-ended questions to collect data. Which of the following statements is true, false, or neither?
- Open-ended questions directly provide quantitative data based on the researcher's predetermined response categories
 - Closed-ended questions provide quantitative data in the participant's own words
 - Open-ended questions provide qualitative data in the participant's own words
 - Closed-ended questions directly provide qualitative data in the participants' own words
7. Complete the following statements:
- Pure research is
 - Applied research is
8. Match the statements below with the four aims and/goals of the social sciences.
- A researcher studying AIDS concludes that the more promiscuous one's behaviour, the greater is the probability of contracting AIDS.
 - The same researcher states that due to the unchanging sexual behaviour of Zambians, he foresees an increase in the number of AIDS victims in the next 10 years.
 - At the start of his analysis, the researcher finds that 65% of AIDS cases are among prostitutes and 35% among the rest of the population.
 - A research learns about the problems experienced by AIDS sufferers by interacting with them for six months.
 - A social scientist investigating the increasing levels of recidivism among juvenile delinquents concludes, after an exhaustive study, that this is due to breakdown of the family in Zambia.
 - A social scientist given a breakdown of the percentage of juvenile delinquents from broken families, their sex and their average ages.
 - A social scientist joins a group of juvenile delinquents at the Inter-City Bus Terminal and tries to learn more about their way of life.
 - After his study of juvenile delinquents, the social scientist suggests, on the basis of the increasing divorce rates among Zambian couples, that in ten years' time one out of every youth will be a juvenile delinquent.
9. Indicate which of the following statements refer to popular modes of knowledge or characteristics of the scientific method:

- a) Separation of values and prejudices from influencing the researcher's judgement
- b) Believing that all valid knowledge resides in the divine
- c) Basing research on observations and experiences
- d) Reducing data into a more ordered form using existing analytical tools such as statistics
- e) Believing something will happen on the basis of a premonition
- f) Coming to a conclusion on the basis of widely held opinions in society
- g) Basing one's judgement on the advice of a witchdoctor
- h) Using reasoning and logic to come to a conclusion
- i) Applying the findings of research to the whole population and socioeconomic contexts
- j) Making a judgement on the basis of what is traditionally taken to constitute the truth.

10. Indicate which of the following statement best defines a paradigm or theory:

- a) The use of qualitative methods in investigating social phenomena.
- b) The positivist approach in research
- c) Examining the relationship between attitudes towards family planning, family size and religious beliefs.
- d) Subscribing to the phenomenological perspective in research.
- e) A purported attempt to explain poverty on the basis of rising levels of poverty in society.

11. Indicate what is wrong with the hypotheses below:

- a) There is a relationship between education and job success
- b) The more religious an individual is, the greater is the likelihood of being saved
- c) The higher educational level of an individual, the better the chances of job success
- d) Female students are less likely to succeed in more demanding jobs
- e) There is a relationship between social class and performance in examinations.

12. What are the scales of measurement of the following variables?

- a) The religious affiliations of students at CBU.
- b) The amount of money has in his bank account at FNB.
- c) The grading system used at Mulungushi University.
- d) The number of male and female students in DEM 2414.
- e) The weights of students in DEM 1110.

13. Which of the two questions below best operationally defines the concept, social class, more accurately and precisely:

- a) What is your father's occupation?
- b) What company does your father work for?
- c) Is your father divorced?
- d) How much does father earn per month?
- e) What is your father's religious affiliation?

14. Complete the following statements:

- a) A cross-sectional study is.....
- b) A longitudinal study is

15. Indicate the type of sampling designs represented by the situations below:

- a) A researcher selects students in his class for a study on gossiping after which he writes a report.
- b) A researcher selects every tenth household after having selected the first household randomly from the first interval of serially numbered households.
- c) A researcher selects ten hostels randomly and then interviews all the students from these hostels.
- d) A researcher selects 100 students using a table of random numbers and then gives self – administered questionnaires to the students.
- e) A researcher subdivides the student population into female and male categories and then selects equal numbers of males and female students randomly in a population where the ratio of males to females is four to one.
- f) A researcher selects every tenth household after having selected the first household randomly from serially numbered households.

16. Complete the following statements:

- a) A general objective is.....
- b) A specific objective is.....

SECTION B

ANSWER ONE QUESTION IN THIS SECTION. THIS SECTION CARRIES 20 PERCENT.

1.

- a) Discuss the more salient advantages disadvantages of an interview
- b) What the more important advantages and disadvantages of a questionnaire
- c) What is the difference between primary and secondary data collection?
- d) Briefly discuss the major advantages and disadvantages of i) primary and ii) secondary techniques of data collection.

2.

- a) Explain the link between hypotheses formulation, measurement, and questionnaire construction.
- b) Give three important reasons why exploratory studies are necessary.
- c) Describe what a quasi-experimental design is and then discuss some strengths of it has over the classical experimental design.

3.

- a) Discuss three conditions to constitute a problem for investigation
- b) Discuss the criteria for prioritization of a research problem.
- c) Discuss some of the important reasons for undertaking literature review.

4.

Discuss the differences and similarities between the sampling designs given below:

- a) Linear and circular systematic sampling
- b) Proportionate and disproportionate sampling
- c) Under what circumstances do you use:
 - i. Simple random sampling

TABLE I Proportions of Area under the Standard Normal Curve







z			z			z		
	O z	O z		O z	O z		O z	O z
0.00	.0000	.5000	0.55	.2088	.2912	1.10	.3643	.1357
0.01	.0040	.4960	0.56	.2123	.2877	1.11	.3665	.1335
0.02	.0080	.4920	0.57	.2157	.2843	1.12	.3686	.1314
0.03	.0120	.4880	0.58	.2190	.2810	1.13	.3708	.1292
0.04	.0160	.4840	0.59	.2224	.2776	1.14	.3729	.1271
0.05	.0199	.4801	0.60	.2257	.2743	1.15	.3749	.1251
0.06	.0239	.4761	0.61	.2291	.2709	1.16	.3770	.1230
0.07	.0279	.4721	0.62	.2324	.2676	1.17	.3790	.1210
0.08	.0319	.4681	0.63	.2357	.2643	1.18	.3810	.1190
0.09	.0359	.4641	0.64	.2389	.2611	1.19	.3830	.1170
0.10	.0398	.4602	0.65	.2422	.2578	1.20	.3849	.1151
0.11	.0438	.4562	0.66	.2454	.2546	1.21	.3869	.1131
0.12	.0478	.4522	0.67	.2486	.2514	1.22	.3888	.1112
0.13	.0517	.4483	0.68	.2517	.2483	1.23	.3907	.1093
0.14	.0557	.4443	0.69	.2549	.2451	1.24	.3925	.1075
0.15	.0596	.4404	0.70	.2580	.2420	1.25	.3944	.1056
0.16	.0636	.4364	0.71	.2611	.2389	1.26	.3962	.1038
0.17	.0675	.4325	0.72	.2642	.2358	1.27	.3980	.1020
0.18	.0714	.4286	0.73	.2673	.2327	1.28	.3997	.1003
0.19	.0753	.4247	0.74	.2704	.2296	1.29	.4015	.0985
0.20	.0793	.4207	0.75	.2734	.2266	1.30	.4032	.0968
0.21	.0832	.4168	0.76	.2764	.2236	1.31	.4049	.0951
0.22	.0871	.4129	0.77	.2794	.2206	1.32	.4066	.0934
0.23	.0910	.4090	0.78	.2823	.2177	1.33	.4082	.0918
0.24	.0948	.4052	0.79	.2852	.2148	1.34	.4099	.0901
0.25	.0987	.4013	0.80	.2881	.2119	1.35	.4115	.0885
0.26	.1026	.3974	0.81	.2910	.2090	1.36	.4131	.0869
0.27	.1064	.3936	0.82	.2939	.2061	1.37	.4147	.0853
0.28	.1103	.3897	0.83	.2967	.2033	1.38	.4162	.0838
0.29	.1141	.3859	0.84	.2995	.2005	1.39	.4177	.0823
0.30	.1179	.3821	0.85	.3023	.1977	1.40	.4192	.0808
0.31	.1217	.3783	0.86	.3051	.1949	1.41	.4207	.0793
0.32	.1255	.3745	0.87	.3078	.1922	1.42	.4222	.0778
0.33	.1293	.3707	0.88	.3106	.1894	1.43	.4236	.0764
0.34	.1331	.3669	0.89	.3133	.1867	1.44	.4251	.0749
0.35	.1368	.3632	0.90	.3159	.1841	1.45	.4265	.0735
0.36	.1406	.3594	0.91	.3186	.1814	1.46	.4279	.0721
0.37	.1443	.3557	0.92	.3212	.1788	1.47	.4292	.0708
0.38	.1480	.3520	0.93	.3238	.1762	1.48	.4306	.0694
0.39	.1517	.3483	0.94	.3264	.1736	1.49	.4319	.0681
0.40	.1554	.3446	0.95	.3289	.1711	1.50	.4332	.0668
0.41	.1591	.3409	0.96	.3315	.1685	1.51	.4345	.0655
0.42	.1628	.3372	0.97	.3340	.1660	1.52	.4357	.0643
0.43	.1664	.3336	0.98	.3365	.1635	1.53	.4370	.0630
0.44	.1700	.3300	0.99	.3389	.1611	1.54	.4382	.0618
0.45	.1736	.3264	1.00	.3413	.1587	1.55	.4394	.0606
0.46	.1772	.3228	1.01	.3438	.1562	1.56	.4406	.0594
0.47	.1808	.3192	1.02	.3461	.1539	1.57	.4418	.0582
0.48	.1844	.3156	1.03	.3485	.1515	1.58	.4429	.0571
0.49	.1879	.3121	1.04	.3508	.1492	1.59	.4441	.0559
0.50	.1915	.3085	1.05	.3531	.1469	1.60	.4452	.0548
0.51	.1950	.3050	1.06	.3554	.1446	1.61	.4463	.0537
0.52	.1985	.3015	1.07	.3577	.1423	1.62	.4474	.0526
0.53	.2019	.2981	1.08	.3599	.1401	1.63	.4484	.0516
0.54	.2054	.2946	1.09	.3621	.1379	1.64	.4495	.0505

TABLE IV Critical Values of Chi Square

df	Level of significance for a non-directional test					
	.20	.10	.05	.02	.01	.001
1	1.64	2.71	3.84	5.41	6.64	10.83
2	3.22	4.60	5.99	7.82	9.21	13.82
3	4.64	6.25	7.82	9.84	11.34	16.27
4	5.99	7.78	9.49	11.67	13.28	18.46
5	7.29	9.24	11.07	13.39	15.09	20.52
6	8.56	10.64	12.59	15.03	16.81	22.46
7	9.80	12.02	14.07	16.62	18.48	24.32
8	11.03	13.36	15.51	18.17	20.09	26.12
9	12.24	14.68	16.92	19.68	21.67	27.88
10	13.44	15.99	18.31	21.16	23.21	29.59
11	14.63	17.28	19.68	22.62	24.72	31.26
12	15.81	18.55	21.03	24.05	26.22	32.91
13	16.98	19.81	22.36	25.47	27.69	34.53
14	18.15	21.06	23.68	26.87	29.14	36.12
15	19.31	22.31	25.00	28.26	30.58	37.70
16	20.46	23.54	26.30	29.63	32.00	39.29
17	21.62	24.77	27.59	31.00	33.41	40.75
18	22.76	25.99	28.87	32.35	34.80	42.31
19	23.90	27.20	30.14	33.69	36.19	43.82
20	25.04	28.41	31.41	35.02	37.57	45.32
21	26.17	29.62	32.67	36.34	38.93	46.80
22	27.30	30.81	33.92	37.66	40.29	48.27
23	28.43	32.01	35.17	38.97	41.64	49.73
24	29.55	33.20	36.42	40.27	42.98	51.18
25	30.68	34.38	37.65	41.57	44.31	52.62
26	31.80	35.56	38.88	42.86	45.64	54.05
27	32.91	36.74	40.11	44.14	46.96	55.48
28	34.03	37.92	41.34	45.42	48.28	56.89
29	35.14	39.09	42.69	46.69	49.59	58.30
30	36.25	40.26	43.77	47.96	50.89	59.70
32	38.47	42.59	46.19	50.49	53.49	62.49
34	40.68	44.90	48.60	53.00	56.06	65.25
36	42.88	47.21	51.00	55.49	58.62	67.99
38	45.08	49.51	53.38	57.97	61.16	70.70
40	47.27	51.81	55.76	60.44	63.69	73.40
44	51.64	56.37	60.48	65.34	68.71	78.75
48	55.99	60.91	65.17	70.20	73.68	84.04
52	60.33	65.42	69.83	75.02	78.62	89.27
56	64.66	69.92	74.47	79.82	83.51	94.46
60	68.97	74.40	79.08	84.58	88.38	99.61

Find the row corresponding to the indicated degrees of freedom, find the column corresponding to the chosen level of significance, the critical value of χ^2_{crit} is at the intersection of that row and that column. If $\chi^2_{obs} \geq \chi^2_{crit}$ then H_0 is rejected.

DEM 2414: STATISTICAL FORMULAS

1

$$\chi^2 = \frac{\sum \sum (O_{ij} - E_{ij})^2}{E_{ij}}$$

$$E_{ij} = \frac{r * c}{N}$$

2.

$$Z_{\text{obs}} = \frac{p_1 - p_2}{\sqrt{\frac{p_1 q_1}{n_2} + \frac{p_2 q_2}{n_2}}}$$

3.

$$r = \frac{N \sum XY - (\sum X) \cdot (\sum Y)}{\sqrt{[N \sum X^2 - (\sum X)^2] [N \sum Y^2 - (\sum Y)^2]}}$$

$$A = \bar{Y} - B \bar{X}$$

$$B = \frac{N \sum XY - (\sum X) \cdot (\sum Y)}{[N \sum X^2 - (\sum X)^2]}$$

- ii. Cluster sampling
- iii. Snowball sampling

d) Given below are data on UNZA students, you are required to do the following:

- i) Select a sample of a sample of 100, the criteria for stratification being hall of residence and year of study.
- ii) Indicate the type stratification method you have used.

Year of study	Hall of residence	
	New Residence	Ruins
Second year	400	200
Third year	300	500
Fourth year	500	100

SECTION C

ANSWER ALL QUESTIONS IN THIS SECTION. THIS SECTION CARRIES 30 PERCENT.

1. The use of the laws of probability to make inferences and draw statistical conclusions about populations based on sample data is referred to as.
 - a) Descriptive statistics
 - b) Inferential statistics
 - c) Sample statistics
 - d) Population statistics

2. If you drew all possible samples from some population, calculated the mean for each of the samples, and constructed a line graph (showing the shape of the distribution) based on all of those means, what would you have?
 - a) A population distribution
 - b) A sample distribution
 - c) A sampling distribution
 - d) A parameter distribution

6. The analysis of variance is a statistical test that is used to compare how many group means?
 - a) Three or more
 - b) Two or more
 - c) One mean

7. What is the standard deviation of a sampling distribution called?
 - a) Sampling error
 - b) Sample error

- c) Standard error
 - d) Simple error
8. As a general rule, researchers tend to use ____ percent confidence intervals.
- a) 99%
 - b) 95%
 - c) 50%
 - d) None of the above
9. When $p < .05$ is reported in a journal article that you read for an observed relationship, it means that the author has rejected the null hypothesis (assuming that the author is using a significance or alpha level of .05).
- a) True
 - b) False
10. When $p > .05$ is reported in a journal article that you read for an observed relationship, it means that the author has rejected the null hypothesis (assuming that the author is using a significance or alpha level of .05).
- a) True
 - b) False
11. _____ are the values that mark the boundaries of the confidence interval.
- a) Confidence intervals
 - b) Confidence limits
 - c) Levels of confidence
 - d) Margin of error
12. In 2015 academic year examinations, the following results were recorded in the DEM 1110 examination:

Mean	63.1
Median	67.1
Mode	60.8
Standard deviation	17.2

Briefly interpret:

- a) Mean
 - b) Median
 - c) Mode
 - d) Standard deviation
13. Which of the following is true about a weighted mean?
- a) It is an arithmetic mean in which each value is given an equal weight as any other value in the distribution.
 - b) It is an arithmetic mean in which each value is given arbitrary group weight regardless of their importance in the overall group.

- c) It is an arithmetic mean in which each value is rarely weighted according to its importance in the overall group.
- d) It is an arithmetic mean in which each value is weighted according to its importance in the overall group.
14. Which of the following is true about the percentile rank?
- a) It shows the score below which a certain number of measurements are located.
- b) It shows the percentage of observations falling below a score.
- c) It is the score below which half the observations are located.
- d) It is the third quartile in a distribution of measurements.
15. Respond to these questions briefly and to the point:
- a) Under what circumstances should a t-distribution be used instead of a normal distribution?
- b) Under what circumstances may a chi-square distribution be used instead of a normal distribution?
- c) Give one property the t – distribution shares with the normal (or z) distribution.
- d) Give one property that distinguishes the t – distribution from the normal (or z) distribution.
- e) In hypothesis testing, when can you use:
- i. A one-tailed test
- ii. A two-tailed test
16. The amount of time required per individual at a bank teller's window at Stanbic Bank has been found to be approximately normally distributed with a mean of 130 seconds and a standard deviation of 45 seconds. What is the probability that a randomly selected individual?
- a) Require less than 100 seconds to complete a transaction?
- b) Spend between 2 and 3 minutes at the teller's window?
- c) Spend less than 2 minutes at the teller's window?
- d) Spend more than 3 minutes at the teller's window?

SECTION D

ANSWER ONE QUESTION IN THIS SECTION. THIS SECTION CARRIES 20 PERCENT.

1. The Zambia Police's Traffic Section lists the reasons for stopping cars and the number of tickets issued for the offences committed. Assume that a car was stopped.

Reason for stopping car	Issued ticket	Not issued ticket	Total
Speeding	40	170	210
No taillights	10	35	45
Failure to use signals	5	25	30
Careless driving	45	70	115

Total	100	300	400
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- a) What is the probability that a ticket is issued?
 - b) What is the probability that a car did not have taillights?
 - c) What is the probability that a driver will get a ticket, given that he or she was stopped for careless driving?
 - d) What is the probability that the person was stopped for speeding or for failure to use signals?
 - e) What is the probability that a driver is speeding and not issued with a ticket?
 - f) Is there a statistically significant relationship between issuance of a ticket and the reason for stopping a car. Use 5 percent level of significance.
2. A developer is considering alternative sites for constructing a shopping mall in Lusaka and Kitwe using the mean household incomes (in thousands) in the two cities as a proxy variable for purchasing power. For a random sample in Lusaka with 30 households, the average annual income is K45,000 with a standard deviation of K1,500. For a random sample of 40 households in Kitwe, the average annual income is K44,600 with a standard deviation of K2,400. The investor eventually decides to construct a shopping mall in Lusaka on the premise that the purchasing power of Lusaka residents is significantly higher than that of Kitwe residents. Is his decision justified? Test this at 1% level of significance?
3. The Ministry of Labour wants to compare newly hired employees who tested “alcohol free” with those who tested “alcohol positive” after six months on the job. They wanted to see whether more alcohol users than alcohol –free employees would be fired after during the six – month probation period. After six months, the following data given below was collected. Would you agree with the conclusion that alcohol users are more likely to be fired than alcohol – free employees? Use 5% level of significance.

	Total hired	Total fired
Alcohol free	3,340	319
Alcohol users	315	42

4. A random sample of 10 employees from the accounting division of ZESCO is shown below:

Employee Number	Weekly Salary (Kwacha)	Years of Service with Company
1	230	2
2	200	3
3	170	1
4	315	5
5	185	1
6	330	7
7	250	4
8	300	7
9	225	6
10	325	9

- a) Compute the correlation coefficient and interpret the result.

- b) Compute a least squares regression equation to show the dependence of salary on experience.
- (i) Interpret the meaning of the observed regression coefficients within the context of the question.
 - (ii) Interpret the meaning of the intercept within the context of the question.
- c) (i) If an employee has been with the company for 4 years, what would you estimate her weekly salary to be?
- (ii) If an employee earns K375 per week, how many years could he have been with the company?

END OF EXAMINATION