



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**FOURTH YEAR FIRST SEMESTER EXAMINATIONS FOR
THE DEGREE OF BACHELOR OF SCIENCE IN APPLIED
STATISTICS WITH INFORMATION TECHNOLOGY**

MAIN CAMPUS

MAS 417: STATISTICAL DEMOGRAPHY II

Date: 29th November, 2016

Time: 8.30 - 11.30 am

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.
- Observe further instructions on the answer booklet.



QUESTION 1

- (a) Distinguish between the terms **Ratio** and **Rate** as applied in demography [2 mks]
- (b) State **two** main uses of **sex ratio at birth** [2 mks]
- (c) Explain the meaning of the following terms: [4 mks]
- (i) migration
 - (ii) migrant
 - (iii) internal migration
 - (iv) migration stream
- (d) Briefly discuss how migration can affect the age and sex composition of the population [2 mks]
- (e) If p_t and p_{t+n} are the sizes of the population at times t and $t+n$,
- (i) show that the rate of growth r is given by
$$r = \frac{2(p_{t+n} - p_t)}{n(p_{t+n} + p_t)}$$
 [4 mks]
 - (ii) from (i) derive the **doubling time**, the time it takes for the population to double itself. [2 mks]
- (f) What are population projections? [2 mks]
- (g) Give a brief account of the two methods used in population projections [4 mks]
- (h) State the **four** fertility assumptions made in population projections [4 mks]
- (j) The population of some hypothetical country called Kisiwani grew from 7 559 338 in 2 000 to 11 345 377 in 2 010
- (i) what was the annual rate of increase [1 mk]
 - (ii) what was the estimated population in 2 005? [1 mk]
 - (iii) what will be the estimated population in 2 018 assuming the same annual rate of increase as occurred between 2 000 and 2 010? [1 mk]
 - (iv) how long would it take for Kisiwani's population to double itself [1 mk]

(Assume census dates: hour, day, month were exactly the same during the census years)

QUESTION 2

(a) Discuss three arguments raised against the use of birth data in estimating the volume of migration. [6 mks]

(b) A survey was carried out in five regions of Ingo County to determine the migratory movements of people in these regions of the County with the results being tabulated as below:

Region of enumeration <i>i</i>	Region of birth <i>j</i>				
	1	2	3	4	5
1	33 827	10	150	26	0
2	2 505	15 260	0	15	0
3	127	68	10 575	0	1
4	0	1	10	11 773	1
5	0	0	0	1	15 739

With reference to the above table:

[14 mks]

(i) estimate the inter-regional migration rate.

(ii) with reference to Region 4 only, estimate:

- The in-migration rate
 - The out-migration rate
 - The net migration rate
 - The gross migration rate
 - The effectiveness ratio
- giving the interpretation of each.

QUESTION 3

(a) Migration and population transfers are two important factors in the economic development of a country. Discuss, giving specific examples [5 mks]

(b) Below are data from some hypothetical West African country from 2 000 and 2 010 censuses:

Region	Area m^2	2 000 pop	2 010 pop
Western	9 236	262 155	770 087
Central	3 794	751 392	890 135
Southern	1 001	491 817	851 614
Eastern	7 713	1 094 196	1 261 661
Coastal	7 943	777 285	947 268
Mid-western	9 417	1 109 133	1 482 698
North Eastern	15 273	587 573	766 509
Northern	27 175	531 573	727 618
Southern Upper	10 548	757 344	862 723

With reference to the table, compute

[15 mks]

(i) the density per m^2 by region for the year 2 010

(ii) the concentration ratio

(iii) the index of concentration

(iv) the index of dissimilarity,

giving the interpretation of each.

QUESTION 4

(a) Describe how you might project the population of some developing country with whose problems you're acquainted, explaining how mortality and migration might be selected, paying particular attention to the economic and social conditions of the country.

[8 mks]

(v) Below is a population projection case for a five year period. Compute the gaps indicated by hyphens (-) [12 mks]

1	2	3	4	5	6	7
Age gp (x to x+5)	Initial pop 2000 $(5P_{x,t}^{(0)})$	Survival ratios 2000-5 $(\frac{5L_{x+5}}{5L_x})$	Pop at end of interval 2000-5 $5P_{x,t+5}^{(1)}$	Mean pop exposed to child bearing during interval $\frac{5P_{x,t}^{(0)} + 5P_{x,t+5}^{(1)}}{2}$	Mean asfr during interval $5f_{x,t}$	Births (males and females) $5B_{x,t}$
0-4	72 650	.98 325	76 163			
5-9	55 836	.99 659	-			
10-	46 872	.99 578	-			
15-	36 169	.99 371	-	-	.1162	-
20-	29 040	.99 247	-	-	.2789	-
25-	25 959	.99 176	-	-	.2904	-
30-	20 835	.99 001	-	-	.2331	-
35-	17 754	.98 714	-	-	.1853	-
40-	14 731	.98 171	-	-	.0792	-
45-	12 540	.97 352	-	-	.0125	-
50-	10 632	.96 940	-			
55-	8 292	.94 038	-			
60-	6 801	.90 457	-			
65-	5 948	.84 369	-			
70-	3 981	.73 393	-			
75+	4 976	.49 150	-			

QUESTION 5

(a) Below are the 2 000 and 2 010 population figures of the towns of some hypothetical country by the name Bugama. Using the **exponential** and the **derived extrapolation** methods, compute the [16 mks]

(i) rate of growth