

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION

ACADEMIC YEAR: 2015/16

TITLE OF PAPER: DEMOGRAPHIC METHODS

CORSE NUMBER: DEM 202

TIME ALLOWED: 3 HOURS

INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO FROM SECTION B. ALL QUESTIONS ARE WORTH 25 MARKS EACH.

REQUIREMENTS: CALCULATOR

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GIVEN BY THE INVIGILATOR

SECTION A (Compulsory)

Question 1

- a) It is often said that women generally live longer than men. Discuss this statement. (6)
- b) Someone proposes calculating an infant mortality rate using the number of births in given calendar year t in the denominator and the number of deaths of persons under age 1 in the same calendar year, t in the numerator arguing this would better reflect the mortality experience of the birth cohort.
- Why might this suggestion not work well in practice? (3 marks)
 - Suggest a modification to the proposal which should lead to an infant mortality rate which better reflects the experience of the births occurring in year t . Use a Lexis diagram to illustrate the rationale behind this argument. (10 marks)
- c) Table 1 presents the number of live births and the number of infant deaths by age at death for Romania. From these data calculate:
- the infant mortality rate in 1970 (IMR). (2)
 - the neo natal mortality rate in 1980. (2)
 - the post neonatal mortality rate in 1980 (2)

TABLE 1: Number of live births and infant deaths by age for Romania, 1970 and 1980

Age (months)	Infant deaths	
	1970	1980
0	12276	7783
1	3625	3009
2	2639	2461
3	2101	2155
4	1384	1584
5	829	1151
6	530	826
7	365	621
8	274	448
9	227	450
10	178	339
11	162	283
Total live births	527 764	427 034

Question 2

- a) Why is it necessary to standardize rates? (2)
- b) The standardized mortality ratio for the town of Burnley in England was 1.23 when the population of England as a whole was used as the standard. What does this tell you about the mortality in Burnley relative to that in England as a whole? (5)
- c) Why do we decompose rates? (2)
- d) The difference in the crude death rates for Mauritius and Germany is partly due to mortality differences and partly due to differences in their age composition. Find the contribution of each of these two components using the data below.(16)

Table 2: Age specific death rates and Proportion of population (weights) for Population A and B

Age group	Population A		Population B	
	r_k^A	w_k^A	R_k^B	W_k^B
0-4	66.96	0.13	5.48	0.13
5-24	3.37	0.44	1.16	0.48
25-44	6.09	0.26	3.23	0.20
45-64	14.69	0.11	11.80	0.13
65+	44.91	0.04	55.04	0.06
Total		1.00		1.00

SECTION B (Answer any 2 questions)

Question 3

- a) Define a parity progression ratio and present a formula for its calculation (3)
- b) Use the information in Tables 3 to answer the following questions:
 - i. Calculate the parity progression ratios. (9)
 - ii. Calculate the cohort total fertility rate using the above calculated parity progression ratios. (2)

Use the information in Table 4 to answer the following questions

- iii. Calculate the total fertility rate using the age-specific fertility rate approach. (2)

- iv. If as a result of a family planning campaign, the age-specific fertility rate for the age group 35-39 were reduced by 40%, by what percentage would the fertility rate be reduced? (3)
- v. Compute the gross reproduction rate, assuming that the sex ratio at birth is 104. (2)

c) A certain hypothetical population has the following parity progression ratios:

$$P_1 = 0.89$$

$$P_2 = 0.85$$

$$P_3 = 0.81$$

Assuming that no woman in this cohort has a fourth child, out of 1000 women, how many have at least 1 child and how many have exactly one child? (4)

Table 3: Distribution of women by Number of Children Ever Born, Swaziland, 1976

Number of CEB	Number of Women
0	35,217
1	15,332
2	13,565
3	12,387
4	11,770
5	11,285
6	10,029
7	8,733
8	7,362
9+	5,413

Table 4: Age Specific Fertility Rates for country A

Age	ASFR
15-19	0.0220
20-24	0.0543
25-29	0.0555
30-34	0.0414
35-39	0.0322
40-44	0.0021
45-49	0.2166

Question 4

- a) Distinguish between generation and abridged life tables. (4)
- b) Using the life table below, compute the following life table indices showing clearly the notation and formulae used:
- i. l_{10} (2)
 - ii. ${}_1d_0$ (2)
 - iii. ${}_5L_5$ (2)
 - iv. T_1 (2)
 - v. T_{15} (2)
 - vi. e_{15} (2)

Table 5: Abridged life table for country X

Age	nq_x	l_x	${}_nd_x$	nL_x	T_x	e_x
0-1	0.03168	100000		97782	6997475	69.97
1-4	0.00793	96832	768	385793		
5-9	0.00344	960064	331		6513900	67.81
10-14	0.00280		268	477998	6034406	63.03
15-19	0.00444	95466	424	476269		
20-24	0.00613	95042	583	473752	5080139	53.45
25-29	0.00747	94459	706	470531	4606386	48.77
30-34	0.00911	93753	854	466632	4135855	44.11

- c) Using the data in Table 6 below, calculate the mean age at marriage for males and females and give an interpretation of the results.(10)

Table 6: Number of people marrying for the first time by age and sex, England, 1991

Age	Males	Females
15-19	4 630	17 704
20-24	74 378	103 689
25-29	91 675	72 523
30-34	34 560	21 000
35-39	10 252	5 785
40-44	3 998	2 075
45-49	1 520	911

Question 5

- Describe the sources of data for migration analysis.(5)
- Using the vital statistics method, calculate the intercensal net migration to or from the following places: (4)

	1996 census	2001 census	Births	Deaths
Greenlane	22400	22100	1872	1018
Kensington	44150	48700	4131	1448

- Using forward survival, calculate age-specific net migrants and rates for the age groups 10-14 and 20-24. (6)

Age in 1976	Age for survival ratio	${}_5S_x$	Population 1976	Population in 1986
0-4	10-14	1.0612	17286	17297
5-9	15-19	0.8879	17129	12013
10-14	20-24	0.8036	13889	7689
15-19	25-29	0.9344	9084	6087
20-24	30-34	0.9823	5693	4613
25-29	35-39	0.9369	5615	4834

- Using the data in Table 7, calculate the number of births born to women aged 15-49 that survive to be aged 0-4 in 1986. (10)

Table 7: Indian Female Population by Age and ASFR

Age group	Population 1981	Population 1986	ASFR
15-19	33 163 600	38 882 496	0.0436
20-24	28 482 300	32 498 670	0.1242
25-29	25 072 700	27 787 902	0.1127
30-34	21 734 600	24 377 183	0.0795
35-39	18 950 900	21 050 612	0.0468
40-44	16 452 800	18 271 889	0.0236
45-49	13 960 400	15 762 934	0.0115

Additional Information: Survivorship ratio is 0.88827

Question 6

- a) What is meant by population projection? (3)
- b) Statistics on mortality are used for different purposes. Discuss. (10)
- c) Provide the formula for calculating the Singulate Mean Age at Marriage (SMAM), clearly defining each of the components of the formula. (8)
- d) If you only have census data on the age/sex structure of the population and total counts of births and deaths, how may you improve the index? (2)
- e) In what way is the General Fertility Rate (GFR) a better measure of fertility than the CBR? (2)