UNIVERSITY OF SWAZILAND

MAIN EXAMINATION 2013/14

TITLE OF PAPER: DEMOGRAPHIC METHODS

CORSE NUMBER: DEM 202

TIME ALLOWED: 3 HOURS

INSTRUCTIONS: ANSWER QUESTION 1 AND 2 AND ANY TWO QUESTIONS 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) Why is it necessary to decompose rates? (2)

b) Describe the two components that are computed when decomposing the difference between two populations' crude death rate. (6)

c) Using the statistics in the table below, calculate the following:

   a. The CDR for the UK and Kuwait. (4)
   b. The directly standardized death rate for Kuwait.(10)
   c. Comment on your results. (3)

Table 1: Population and Deaths by age, UK and Kuwait, 1996

	UK		Kuwait	
Age group	**Population**	**Deaths**	**Population**	**Deaths**
0-4	3 763 438	6018	183 169	620
5-14	7 594 916	1207	329 010	106
15-24	7 325 068	4264	267 584	181
25-44	13 223 708	12 849	765 975	627
45-64	13 354 266	92 470	185 232	967
65+	9 250 797	514 960	23 011	1314

Question 2

a) It is often said that women generally live longer than men. Discuss this statement. (10)

b) Someone proposes calculating an infant mortality rate using the number of births in a 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.
   a) Why might this suggestion not work well in practice? (2)
   b) 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*. (4)

c) Given the following births and infant deaths recorded in Belgium, calculate:
   I. The conventional infant mortality rate for 1968. (3)
   II. The adjusted infant mortality rate for 1968 using the cohort method (3)
   III. The adjusted infant mortality rate for 1968 using the additive method (3)

Year	Birth Cohort	Age (yrs)	Deaths	Births
1967	1967	0	2 893	142 471
1968	1967	0	481	-------
1968	1968	0	2 603	138 214
1969	1968	0	302	--------

SECTION B: ANSWER ANY TWO QUESTIONS

Question 3

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 3: Abridged life table for country A

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	96064	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) Is a stationary population also a stable population? Explain your answer. (4)

d) At the start of the 21st century, China had an estimated R_0 of 0.81297 and an R_1 of 23.52850. Calculate the population's intrinsic rate of natural increase and the mean length of a generation (5)

Question 4

a) Why is the study of nuptiality of importance in demography? (6)

b) Using the data in Table 4 below, calculate the mean age at first marriage for males and females and give an interpretation of the results.(12)

Table 4: 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

c) Using the data given below, calculate the singulate mean age at marriage for females in Sweden in 1945. Interpret your results.(7)

Table 5: Proportions of Females Never Married, Sweden, 1945

Age group	% single females
15-19	97.0
20-24	63.6
25-29	30.4
30-34	20.4
35-39	19.0
40-44	20.4
45-49	21.0
50-54	21.0

Question 5

a) Distinguish between lifetime migration and return migration (4)

b) Table 6 shows the numbers of males by age group recorded in the Barbados censuses of 1970 and 1980. It is assumed that the intercensal mortality

conditions are represented by the given life table values. Using the life table forward survival ratio method, calculate:

i. The number of net migrants for the age groups 15-19 and 35-39 in 1980. (6)
ii. The net intercensal migration rates for the above age groups. (6)

Table 6: Male Population and life table survivorship by age, Barbados, 1970 and 1980

	Male Population		Life table survivorship	
Age group	**1970**	**1980**	**Age x**	**$_nL_x$**
10-14	14996	12859	10	479193
15-19	12829	13642	15	477275
20-24	9875	12382	20	474287
25-29	5724	10001	25	470794
30-34	4808	7724	30	467100
35-39	4295	5019	35	462661
40-44	4540	4379	40	456544
45-49	4300	3862	45	447177

c) Using the data in Table 7, project the female population aged 0-4 for a hypothetical population using the component method.(9)

Table 7: Female Population by Age (1970 and 1975) and ASFR.

Age	**Base Year Female Population**	**Projected Female Population**	**ASFR**
15-19	18200	20000	0.080
20-24	18000	19300	0.100
25-29	17800	18500	0.160
30-34	17600	18200	0.080
35-39	17400	18100	0.050
40-44	17200	18000	0.030
45-49	17000	17900	0.010

Additional information: $_5L_5/5l_0 = 0.97895$

Question 6

a) If the crude birth rate in a country remains constant over a number of years but the general fertility rate increases steadily, what does this tell you about the country's population? (3)

b) Using the data in Table 8, below calculate the following:
   i) ASFRs for age groups 15-19 and 25-29 (2)
   ii) The total fertility rate (4)

iii) The Gross Reproduction Rate (3)
iv) The Net Reproduction Rate (6)

Table 8: Statistics for fertility calculation, Australia, 1996

Age	Total births	Female births	Total women	Survival Probability
15-19	12509	5988	621542	0.99175
20-24	44837	21807	694273	0.98985
25-29	82782	40278	709746	0.98792
30-34	76435	37227	720453	0.98566
35-39	31864	15359	727555	0.98261
40-44	5113	2470	672182	0.97826
45-49	128	61	640985	0.97152

c) Suppose a certain hypothetical birth cohort for women has the following parity progression ratios:

$P_1 = 0.862$
$P_2 = 0.804$
$P_3 = 0.555$
$P_4 = 0.518$

Assuming that no woman in this birth cohort had a fifth child, out of 1 000 women calculate:

i) the number of women who remain childless (2)
ii) the number of women who have exactly one child? (2)
iii) the cohort total fertility rate (3)