UNIVERSITY OF SWAZILAND

MAIN EXAMINATION 2017

TITLE OF PAPER: DEMOGRAPHIC METHODS II

COURSE NUMBER: DEM 212

TIME ALLOWED: 2 HOURS

INSTRUCTIONS: ANSWER QUESTION 1 AND ANY TWO QUESTIONS. ALL QUESTIONS ARE WORTH 30 MARKS EACH.

REQUIREMENTS: CALCULATOR

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

Question 1 (Compulsory)

a) What is the main difference between an ordinary life table and a multiple decrement life table (3)

b) If a cohort is defined as "professional soccer players," and the relevant life experience is defined as starting with the first game played as a professional and ending with the last game played as a professional, which of the following would not be a possible attrition factor? (3)

i. career-ending injury
ii. retirement
iii. death
iv. all of the above are possible attrition factors

c) Use the data presented in Table 1 below to compute the eventual probabilities of death for cause of death 1 and cause of death 2. Show all your calculations. (20)

Table 1: Distribution of life table deaths by cause for males in country X, 1960

Age	${}_nd_x$	${}_nq_x$	l_x	Deaths	Deaths^1	Deaths^2
0-1	7230	0.07230	100000	2235	538	2
1-4	2566	0.02765	92770	654	140	13
5-9	768	0.00851	90204	142	10	8
10-14	569	0.00636	89436	87	1	5
15-19	570	0.00641	88867	72	2	4
20-24	793	0.00899	88298	87	0	6
25-29	712	0.00814	87504	67	0	7
30-34	854	0.00984	86792	70	2	4
35-39	1287	0.01497	85938	86	2	10
40-44	1849	0.02184	84651	103	1	23
45-49	2629	0.03175	82802	136	0	20
50-54	3615	0.04509	80173	159	3	46
55-59	4975	0.06498	76558	176	2	55
60-64	7979	0.11146	71583	233	4	74
65-69	10564	0.16609	63605	246	3	62
70-74	12107	0.22826	53040	246	5	47
75-79	13002	0.31765	40933	220	3	44
80-84	13724	0.49135	27931	169	5	23
85_+	14207	1.0000	14207	154	5	13

d) Based on your calculations above, provide answers for the following questions:

I. How many people die due to cause of death 1 after age 10? (2)
II. Among 100 000 newborn children, how many will die at age 0 due to cause of death 2? (2)

Question 2

a) Define the following:
   I. Attrition factors (2)
   II. Survival analysis (2)
   III. Right censoring (2)
   IV. Follow up time (2)
   V. Migration expectancy (2)

b) What assumptions are made when constructing a clinical life table? (4)

c) Consider a prospective study designed to study time to death. The study involves 20 participants who are 65 years and older, enrolled over a 5 year period followed up to 24 years until they dies or the study ends or they drop out. The table below indicates when they enrolled and what subsequently happened to them during the observation period. Summarize the experience of the participants by constructing a clinical life table. (16)

Table 2: Cohort study designed to study time to death

Participant Identification Number	Year of death	Year of last contact
1		24
2	3	
3		11
4		19
5		24
6		13
7	14	
8		2
9		18
10		17
11		24
12		21
13		12
14	1	
15		10
16	23	
17		6
18	5	
19		9
20	17	

Question 3

a) A net nuptiality table is a type of double decrement table. Which are the forces of decrement and which state is being decremented? (3)

b) What is the main difference between a gross and net nuptiality table? (2)

c) Define the following net nuptiality notation and provide a formula for their calculation: (10)

i. $1000q_x$
ii. d'_x
iii. L'_x
iv. T'_x
v. e'_x

d) Specify one disadvantage of migration expectancy as a measure of the occurence of migration? (2)

e) What is the main benefit of the migration effectiveness ratio? (3)

f) Using the data provided in Table 3 below, compute the migration expectancy for the United States. (10)

Table 3: Migration expectancy for the United States,1997-98

Age	Total population (in thousands)	Movers (1997-98)	l_x	T_x
1-4	15802	3552	99268	396721
5-9	20453	3526	99118	495329
10-14	19663	2755	99022	494883
15-19	19466	2864	98905	493650
20-24	17613	5607	98519	491362
25-29	18996	5442	98020	488766
30-34	20358	4267	97487	485746
35-39	22691	3568	96795	481820
40-44	21771	2570	95881	476549
45-49	18634	1798	94651	469305
50-54	15424	1242	92946	458779
55-59	12190	916	90406	443132
60-64	10065	574	86630	419530
65-69	9361	439	80870	385659
70-74	8512	389	73056	339620
75-79	6898	276	62422	280047
80-84	4383	186	49276	207474
85_+	2928	130	36629	204073
Total	265208	40101		

Question 4

a) What assumptions are made for the use of censored data? (4)

b) What data are required for constructing a net nuptiality table? (2)

c) Give 3 uses of the net nuptiality table. (6)

d) What is the intrisic growth rate of a population? (2)

e) Describe 3 characteristics of a stable population. (6)

f) At the start of the 20th century, China had an estimated R_o of 0.81297 and R_1 of 23.52850. Calculate the mean length of a generation in China and the population's intrisic rate of natural increase. (3)

g) Using the data for a growing Western population given in Table 4 below, compute the intrisic growth rate for the population. (7)

Table 4: Data for a growing Western population, 2000

Age	Mid point	Female ASFRs	Survival probability ($5L_x/5^*l_0$)
15-19	17.5	0.01326	0.97914
20-24	22.5	0.04324	0.97703
25-29	27.5	0.07812	0.97421
30-34	32.5	0.07113	0.97061
35-39	37.5	0.02906	0.96577
40-44	42.5	0.00506	0.95870
45-49	47.5	0.00013	0.94751