UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION, JULY 2012

TITLE OF PAPER:	**INDIRECT TECHNIQUES OF DEMOGRAPHIC ESTIMATION**
COURSE CODE:	**DEM 303**
TIME ALLOWED:	**THREE (3) HOURS**
INSTRUCTIONS:	**ANSWER ANY FOUR QUESTIONS. ALL QUESTIONS ARE WORTH 20 MARKS EACH.**
REQUIREMENTS:	**CALCULATOR**

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Question 1

a. What is meant by model life tables? Describe any two uses of model life tables.

b. Point out the limitations of the following:

   i) Coale and Demeny (Princeton) regional model life tables and

   ii) United Nations model life tables.

c. Describe in detail the El-Badry method.

Note: Make sure to describe the rationale or purpose, assumptions, data requirements, computational procedure, and resulting estimates.

Question 2

Table below gives the data needed to calculate Coale's indices for Bangladesh, 1974. The estimated total number of births in Bangladesh in 1974 was 3,689,000 and there was a negligible amount of illegitimacy.

Data for calculating Coale's indices for Bangladesh, 1974

		Estimated population (000s)	
Age group of women	Hutterite standard	All females	Married females
15-19	0.300	3777	2432
20-24	0.550	3101	2828
25-29	0.502	2636	2494
30-34	0.447	2161	2012
35-39	0.406	1793	1606
40-44	0.222	1484	1211
45-49	0.061	1222	892

a. When would it be particularly appropriate to use Coale's indices?
b. What assumptions are you making when using the indices to compare fertility levels between different areas or over time?
c. Calculate Coale's Indices.
d. Use the Coale-Trussell fertility schedule to estimate the M and m scale factors. Comment on your answers.

Question 3

Discuss the rationale, data requirements, assumptions and limitations of ANY **TWO** of the following indirect estimation methods:

a. Sisterhood method;

b. Brass growth balanced method; and,

c. Preston and Coale method.

Question 4

A prospective dual record demographic survey called the 'Population Change' was carried out in Malawi during 1970-2. The life table was calculated directly from the data obtained by the survey.

Observed life table: Malawi, 1970-1972

Age	l_x
0	1000
1	858
5	653
10	603
15	592
20	559
25	548
30	528
35	511
40	492
45	460
50	435
55	404
60	381

a. Find the parameters α and β of a two-parameter Brass relational model life table, using the General Standard life table as the standard.
b. Compare the fitted $l_x s$ with the observed ones.
c. What are the main differences?
d. Discuss the accuracy of and possible causes of errors in the observed figures.
e. What do the data suggest about the age pattern of mortality in Malawi?

Question 5

a. Describe in detail **ANY ONE** of the following fertility methods:

   i) Brass P/F ratio method for estimating fertility based on children ever born.

   ii) Relational Gompertz Model of fertility schedule.

b. Describe in detail **ANY ONE** of the following methods of estimating mortality:

   i) Widowhood method

   ii) Orphanhood method

Note: Make Sure to describe the purpose, assumptions, data requirements, computational procedure, resulting estimates and limitations.

Question 6

You are given the following tabulations of data relating to sons born and sons surviving by age of mother from the 2002 Zimbabwe census data. The average census date was 2002.627. Using the Brass children ever born and children surviving method, and assuming that mortality follows the West family model life tables (given in annex):

a) Define the parameters to be calculated given in the tabulations.
b) Estimate the male child mortality levels by filling blank spaces in the tabulations.
c) Comment on child mortality levels in this country.

Age group	Index	Wi	CEBi	CSi	CDi	Pi	Di
15-19	1	766882	69352	64317	5035	-------	0.0726
20-24	2	658857	347375	319447	27928	-------	0.0804
25-29	3	513783	535319	489377	45942	-------	-------
30-34	4	360277	546691	500238	-------	1.5174	-------
35-39	5	268789	555112	507881	47231	2.0652	-------
40-44	6	239716	612986	552286	60700	2.5571	0.0990
45-49	7	191154	548148	482831	65317	-------	0.1192
Total		**2999458**	**3214983**	**2916377**	**298606**		

Age group	Index	Coefficients[a]			Ki	qx	lx
i		ai	bi	ci			
15-19	1	1.1415	-2.7070	0.7663	-------	-------	0.9227
20-24	2	1.2563	-0.5381	-0.2637	-------	-------	-------
25-29	3	1.1851	0.0633	-0.4177	0.9846	0.0845	-------
30-34	4	1.1720	0.2341	-0.4272	0.9960	0.0846	0.9154
35-39	5	1.1865	0.3080	-0.4452	-------	-------	0.9137
40-44	6	1.1746	0.3314	-0.4537	1.0019	-------	0.9008
45-49	7	1.1639	0.3190	-0.4435	-------	0.1185	0.8815

[a] Coefficients for estimation of child mortality multipliers, Trussell variant

Age group	Coefficients[b]			Age x	qx	tx	Mortality	Reference
i	ai	bi	ci				level	date
15-19	1.0970	5.5628	-1.9956	1	q1	1.0413	17.75	-------
20-24	1.3062	5.5677	0.2960	2	q2	-------	-------	2000.2
25-29	1.5305	2.5528	4.8962	3	q3	-------	18.51	1998.2
30-34	1.9991	-2.4261	10.4282	5	q5	-------	-------	1995.8
35-39	2.7632	-8.4065	16.1787	10	q10	-------	19.20	1993.1
40-44	4.3468	-13.2436	20.1990	15	q15	12.2965	-------	1990.3
45-49	7.5242	-14.2013	20.0162	20	q20	15.2171	18.36	-------

[b] Coefficients for estimation of the reference period t(x) to which the values of qx estimated from data classified by age refer.

ANNEX

Table A1: Brass General and African Standard life table l_x's and logits

Age	General Standard		Age	African Standard	
x	l_x	Ys(x)	x	l_x	Ys(x)
0	1		0	1	
1	0.8499	-0.867	1	0.8802	-0.9972
2	0.807	-0.7153	2	0.8335	-0.8053
3	7876	-0.6553	3	0.8101	-0.7253
4	0.7762	-0.6218	4	0.7964	-0.682
5	0.7691	-0.6016	5	0.7863	-0.6514
10	0.7502	-0.5498	10	0.7502	-0.5498
15	0.7362	-0.5131	15	0.7362	-0.5131
20	0.713	-0.4551	20	0.713	-0.4551
25	0.6826	-0.3829	25	0.6826	-0.3829
30	0.6525	-0.315	30	0.6525	-0.315
35	0.6223	-0.2496	35	0.6223	-0.2496
40	0.5898	-0.1817	40	0.5898	-0.1817
45	0.5535	-0.1073	45	0.5535	-0.1073
50	0.5106	-0.0212	50	0.5106	-0.0212
55	0.4585	0.0832	55	0.4585	0.0832
60	0.3965	0.21	60	0.3965	0.21
65	0.321	0.3746	65	0.321	0.3746
70	0.238	0.5818	70	0.238	0.5818
75	0.1516	0.8611	75	0.1516	0.8611
80	0.0768	1.2433	80	0.0768	1.2433
85	0.0276	1.781	85	0.0276	1.781
90	0.0059	2.5634	90	0.0059	2.5634
95	0.0006	3.709	95	0.0006	3.709
100	0		100	0	

Source: Carrier and Hobcraft (1973)

Table A2: Hutterite marital ASFRs, 1921-30

Age group	Hutterite Standard
15-19	0.300
20-24	0.550
25-29	0.502
30-34	0.447
35-39	0.406
40-44	0.222
45-49	0.061

Table A3: Five year n(a) and v(a) for Coale-Trussel fertility model

Age group (a)	n(a)	v(a)
15-19	0.411	0.000
20-24	0.460	0.000
25-29	0.431	-0.279
30-34	0.395	-0.667
35-39	0.322	-1.042
40-44	0.167	-1.414
45-49	0.024	-1.671

TABLE 237. MALE PROBABILITY OF SURVIVING FROM BIRTH, $l(x)$, WEST MODEL

	Probability of surviving from birth, $l(x)$									
Level	$l(1)$	$l(2)$	$l(3)$	$l(4)$	$l(5)$	$l(10)$	$l(15)$	$l(20)$	$l(25)$	$l(30)$
1	0.58093	0.50308	0.46898	0.44665	0.43005	0.40102	0.38160	0.35676	0.32385	0.29032
2	0.61657	0.54152	0.50865	0.48712	0.47112	0.44211	0.42258	0.39740	0.36384	0.32940
3	0.64868	0.57690	0.54546	0.52488	0.50957	0.48093	0.46151	0.43631	0.40254	0.36765
4	0.67785	0.60967	0.57980	0.56024	0.54571	0.51769	0.49858	0.47360	0.43997	0.40504
5	0.70454	0.64015	0.61195	0.59348	0.57976	0.55258	0.53393	0.50938	0.47619	0.44154
6	0.72911	0.66865	0.64217	0.62482	0.61194	0.58575	0.56770	0.54375	0.51125	0.47718
7	0.75183	0.69537	0.67064	0.65445	0.64242	0.61737	0.60000	0.57680	0.54520	0.51195
8	0.77294	0.72052	0.69756	0.68253	0.67135	0.64754	0.63095	0.60862	0.57808	0.54587
9	0.79263	0.74425	0.72307	0.70919	0.69888	0.67639	0.66064	0.63926	0.60995	0.57895
10	0.81105	0.76671	0.74728	0.73457	0.72511	0.70401	0.68916	0.66882	0.64085	0.61122
11	0.82835	0.78800	0.77032	0.75875	0.75015	0.73048	0.71657	0.69734	0.67083	0.64269
12	0.84463	0.80822	0.79228	0.78184	0.77408	0.75588	0.74296	0.72489	0.69991	0.67340
13	0.86058	0.82912	0.81534	0.80632	0.79961	0.78315	0.77147	0.75456	0.73107	0.70613
14	0.87547	0.84833	0.83644	0.82866	0.82287	0.80800	0.79734	0.78167	0.75985	0.73670
15	0.88864	0.86523	0.85498	0.84826	0.84327	0.82988	0.82018	0.80571	0.78554	0.76421
16	0.90143	0.88164	0.87292	0.86720	0.86293	0.85103	0.84234	0.82912	0.81070	0.79128
17	0.91379	0.89790	0.89056	0.88561	0.88184	0.87145	0.86377	0.85187	0.83526	0.81782
18	0.92570	0.91334	0.90736	0.90321	0.90001	0.89112	0.88447	0.87391	0.85917	0.84379
19	0.93713	0.92796	0.92332	0.92002	0.91744	0.91004	0.90444	0.89524	0.88240	0.86912
20	0.94807	0.94179	0.93847	0.93606	0.93415	0.92823	0.92366	0.91584	0.90493	0.89376
21	0.95909	0.95508	0.95285	0.95121	0.94989	0.94536	0.94174	0.93531	0.92636	0.91730
22	0.96925	0.96675	0.96531	0.96422	0.96334	0.96004	0.95734	0.95234	0.94540	0.93847
23	0.97856	0.97719	0.97636	0.97573	0.97521	0.97303	0.97119	0.96758	0.96261	0.95773
24	0.98668	0.98605	0.98566	0.98535	0.98510	0.98385	0.98273	0.98041	0.97723	0.97419
	$l(35)$	$l(40)$	$l(45)$	$l(50)$	$l(55)$	$l(60)$	$l(65)$	$l(70)$	$l(75)$	$l(80)$
1	0.25560	0.22002	0.18354	0.14906	0.11464	0.08363	0.05422	0.03036	0.01343	0.00392
2	0.29339	0.25603	0.21712	0.17957	0.14123	0.10564	0.07088	0.04149	0.01953	0.00631
3	0.33087	0.29227	0.25149	0.21137	0.16955	0.12967	0.08963	0.05452	0.02706	0.00949
4	0.36793	0.32858	0.28645	0.24424	0.19939	0.15552	0.11037	0.06943	0.03607	0.01358
5	0.40449	0.36482	0.32183	0.27799	0.23056	0.18304	0.13299	0.08619	0.04660	0.01863
6	0.44052	0.40092	0.35749	0.31246	0.26289	0.21207	0.15738	0.10475	0.05868	0.02471
7	0.47598	0.43678	0.39332	0.34751	0.29623	0.24248	0.18343	0.12506	0.07232	0.03189
8	0.51084	0.47236	0.42922	0.38301	0.33044	0.27411	0.21102	0.14705	0.08750	0.04020
9	0.54509	0.50760	0.46512	0.41887	0.36540	0.30686	0.24006	0.17066	0.10421	0.04967
10	0.57872	0.54247	0.50095	0.45499	0.40100	0.34061	0.27043	0.19580	0.12243	0.06032
11	0.61173	0.57693	0.53665	0.49129	0.43713	0.37524	0.30203	0.22241	0.14213	0.07217
12	0.64412	0.61096	0.57217	0.52769	0.47371	0.41066	0.33477	0.25040	0.16326	0.08522
13	0.67851	0.64700	0.60979	0.56636	0.51289	0.44893	0.37047	0.28128	0.18685	0.10007
14	0.71104	0.68144	0.64599	0.60365	0.55049	0.48547	0.40446	0.31063	0.20934	0.11431
15	0.74051	0.71292	0.67936	0.63833	0.58585	0.52025	0.43729	0.33944	0.23186	0.12890
16	0.76966	0.74425	0.71283	0.67345	0.62205	0.55629	0.47179	0.37023	0.25638	0.14518
17	0.79839	0.77532	0.74627	0.70886	0.65894	0.59346	0.50788	0.40295	0.28295	0.16323
18	0.82663	0.80602	0.77956	0.74440	0.69636	0.63159	0.54542	0.43755	0.31158	0.18314
19	0.85429	0.83626	0.81255	0.77991	0.73412	0.67051	0.58427	0.47392	0.34223	0.20495
20	0.88131	0.86593	0.84513	0.81525	0.77205	0.71002	0.62422	0.51188	0.37481	0.22866
21	0.90714	0.89437	0.87637	0.84935	0.80890	0.74900	0.66439	0.55098	0.40931	0.25456
22	0.93070	0.92076	0.90621	0.88314	0.84717	0.79148	0.71057	0.59846	0.45378	0.29018
23	0.95227	0.94512	0.93416	0.91556	0.88503	0.83508	0.75995	0.65154	0.50591	0.33422
24	0.97079	0.96622	0.95876	0.94496	0.92076	0.87826	0.81150	0.71014	0.56701	0.38934