

UNIVERSITY OF SWAZILAND



MAIN EXAMINATION PAPER 2016/2017

TITLE OF PAPER : POPULATION ESTIMATES AND PROJECTIONS

COURSE CODE : DEM 301

TIME ALLOWED : TWO (2) HOURS

INSTRUCTION : ANSWER ANY THREE QUESTIONS

REQUIREMENT : SCIENTIFIC CALCULATOR

Question 1

Study the data in Table 1 to answer questions a. to c.

Table 1: Projection of the Swaziland's Female Population, by Age, by the Census-Cohort Change Method, 2017-2027

Age Groups (x)	Female Population 1997	Female Population 2007	Projected Female Population 2017	Projected Female Population 2027
[1]	[2]	[3]	[4]	[5]
0-4	68868	64092	70136
5-9	70269	68420	77331
10-14	69287	70541	65649	71840
15-19	57581	66203	72856
20-24	46287	60035	61122	56883
25-29	37896	46552	53523	52114
30-34	30168	32623	42313	43078
35-39	26157	27425	33689	38734
40-44	19340	22314	31297
45-49	15910	18992	19913	24461
50-54	12517	14240	16430	17767
55-59	9162	11022	13157	13795
60-64	7541	11092	12619	14559
65+	17015	22955	38437
Total	487998	536506	585154	632161

a. Project the female population to the year 2017 for the age groups:

- i. 15-19 years [3]
- ii. 40-44 years [3]
- iii. 65+ years [3]

b. Project the female population to the year 2027 for the age groups:

- i. 0-4 years [4]
- ii. 5-9 years [4]

c. Calculate the exponential growth rate of the population from 1997 to 2027 [3]

[20 marks]

Question 2

- a. State **two** advantages and **three** disadvantages of the mathematical models of population estimation and projection [5]
- b. Describe the multiregional projection, its computational procedure and its disadvantages [12]
- c. A particular country had an estimated R_0 of 0.92 and an R_1 of 25.21 in the year 2005. Calculate the population's intrinsic rate of natural increase [3]

[20 marks]

Question 3

- a. Outline the three major types of “non-censal counts” [3]
- b. Distinguish between a principal projection and analytical projections [4]
- c. The population of Kansas in 2012 was 2,885,398 with data on the components of population change for the 2012–2013 period shown below:

Births = 39,624

Net domestic migration = -12,557

Net international migration = +5,105

Deaths = 23,701

- i. Assuming a sex ratio of 1.03, how many of the Kansas births were female? [2]
- ii. Estimate the population in 2013? [4]
- iii. Given the 2013 estimate, calculate the geometric growth rate between 2012 and 2013? [2]
- iv. Based on the 2013 estimate and growth rate obtained in iii., when will the population of Kansas reach 6 million? [3]
- v. When will the population of Kansas double in size [2]

[20 marks]

Question 4

Table 2: Data on female population (thousands), number of person years lived in each interval, fertility rates and number of migrants for a Health and Demographic Surveillance Site in South Africa, Agincourt, 2010.

Age Groups (x)	n	${}_nN_x^F$ (2010.0)	${}_nL_x^F$	${}_5F_x$	${}_5I_x$ [2005.0,2010.0]
[1]	[2]	[3]	[4]	[5]	[6]
0-4	5	3,262	466,558		116
5-9	5	3,611	458,199		59
10-14	5	3,875	457,587		54
15-19	5	3,335	456,607	0.2201	44
20-24	5	2,268	451,444	0.3536	90
25-29	5	1,733	433,823	0.3635	120
30-34	5	1,456	402,703	0.3125	108
35-39	5	1,282	366,841	0.2418	82
40-44	5	1,135	332,828	0.1251	67
45-49	5	941	298,462	0.0308	68
50-54	5	824	259,736		61
55-59	5	650	220,582		64
60-64	5	592	185,470		61
65-69	5	558	151,997		30
70+	∞	1,364	268,762		0
All		26,886			

NB: Sex ratio at birth = 1.05 $l_0 = 100,000$ Births [2010.0, 2015.0] = 17,813

Use the data presented in Table 2 to answer the questions below:

- a. What is the total fertility rate (TFR)? [3]
- b. What will be the projected number of births in the year 2010 to 2015 for women in the reproductive age groups:
 - i. 20-24 years [3]
 - ii. 45-49 years [3]
- c. What will be the projected female population in the year 2010 to 2015 for the age groups:
 - i. 0-4 years [4]
 - ii. 15-19 years [3]
 - iii. 70 + years [4]

[20 marks]