



**DEPARTMENT OF DEMOGRAPHY AND SOCIAL STATISTICS**  
**OBAFEMI AWOLowo UNIVERSITY, ILE-IFE**  
**DSS 402 RAIN SEMESTER 2010/2011 Rain Semester Examination**

**INSTRUCTION:** Answer questions 1 & 2 and any other two questions

**TIME ALLOWED:** 2 hours 30 minutes

1. The data below relates to the distribution of population in six selected states of Nigeria for two consecutive censuses

State	2006 Census	1991 Census
Lagos	9, 013,534	5,725,116
Kano	9, 383,682	5,810,470
Kaduna	6,066,562	3,935,618
Oyo	5,591,589	3,452,720
Rivers	5,185,400	4,309,557
Imo	3,934,899	2,485,635

- a. Obtain the average annual rate of growth ( $r$ )
- for Lagos and Kano states using the arithmetic growth model
  - for Kaduna and Oyo states using the geometric growth model
  - for Rivers and Imo states using the discrete exponential growth model
- b. Use the arithmetic growth model and your result in (a) to project the population of Lagos and Kano states to 2020.
- c. Use the geometric growth model and your result in (a<sub>ii</sub>) to project the population of Kaduna and Oyo states to 2020. (Correct your answers to 2 decimal places).
2. The data below represents the age distributions of the female population of an African country as reported in the country's most recent census, as well as values of  $C_x$  and various parameters in female stable populations with  $r=0.023$ .

Age $x$	proportion up to age $x$		Values of $C_x$ and other parameters		
	$C_x$		level 7	level 9	level 11
5	10.4		9.78	11.19	12.51
10	9.8		18.20	20.60	22.82
15	10.2		26.36	29.50	32.36
20	10.3		34.37	38.04	41.33
25	7.2		42.21	46.21	49.73
30	7.9		49.82	53.95	57.54
35	6.2		57.15	61.24	64.73
40	7.9		64.14	68.02	71.28
45	6.8		70.73	74.28	77.21
Birth rate			29.19	30.30	34.23
Death rate			31.37	30.81	30.58
$e_0$			35	40	45
GRR ( $m=29$ )			2.233	2.569	2.953
GRR ( $m=31$ )			2.393	2.751	3.161

- i. Cumulate the proportion up to each age and compute the birth rates, death rates, expectations of life at birth and the GRR ( $m=29.8$ ) corresponding to each age.

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- ii. What will be the corresponding male birth rate and total fertility rate assuming a sex ratio at birth of 1.04 and considering that the sex ratio of the population (as reported by the census) was 0.9996.
- iii. Adjust the estimates of the birth and gross reproduction rates assuming that mortality has been declining at a steady rate in this population over the last two decades.
3. i. Compare the Zechariah and New methods of adjusting stable estimates of fertility when the age distribution is used in combination with the rate of growth.  
ii. List the advantages of the new method for adjusting stable estimates over the Coale and Demeny method
4. Discuss the basic features of stable estimates of birth and gross reproduction rates of a quasi stable population. Discuss the shortcomings of the Coale and Demeny method of adjusting stable estimates of the birth and gross reproduction rates.
5. Define interpolation. How does it differ from extrapolation? Interpolate to find the level of mortality corresponding to the proportion of children dying before completing the first year of life (both sexes combined) in a West model life table assuming that  ${}_1q_0$  is 0.142 (use table provided).
6. Clearly define and compare the following terms giving examples where necessary
  - i. cumulative and completed fertility rates
  - ii. Interpolation and extrapolation
  - iii. Projections and estimates
  - iv. Predictions and forecasts
  - v. Projections and forecasts

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