DEMOGRAPHY AND ECOLOGY WRITTEN PRELIMINARY EXAM
JANUARY 4, 1999

Afternoon Exam

IV. DISTRIBUTION. Answer A **or** B:

A. There is a good deal of contemporary scholarly and policy concern about the urban ghetto. Write an essay on this topic including:
   1. The history of the concept of the ghetto in American social science.
   2. How the Black ghetto is similar to and different from other ghettoes that have existed in the U.S.
   3. An argument about whether the black ghetto is going away or not.

B. The spatial redistribution of population toward urban areas has been a unique characteristic of developing countries for many decades. Provide a detailed and critical discussion of why this happens, even in the face of very high urban unemployment. Critically discuss appropriate policies to deal with such migration, in particular, policies to "alter" migration flows.

V. METHOD. Answer A **or** B:

A. Consider a single homogeneous population in which there is no migration and in which growth in the population is characterized by Equation (1)

$$dN(t)/dt = a\, N(t) \qquad (1)$$

where N(t) denotes the size of the population at time t and dN(t)/dt denotes change in the size of the population at time t. The above equation can be shown to be equivalent to the perhaps more familiar relationship

$$\log N(t) = a * t \qquad (2a)$$

or

$$N(t) = \exp(a * t) \qquad (2b)$$

   1. Provide a demographic interpretation of the parameter a in Equations (2a) or (2b).

Now consider a population composed of two subgroups in which the size of one group may affect the size of the other. Denote the size of the two groups at time t by $N_1(t)$ and $N_2(t)$; then consider the simple model due to Lotka:

$$dN_1(t)/dt = a_{11} N_1(t) + a_{12} N_2(t)$$
$$dN_2(t)/dt = a_{21} N_1(t) + a_{22} N_2(t) \quad (3)$$

where $dN_1(t)/dt$ and $dN_2(t)/dt$ denote change in the population size of groups 1 and 2, respectively, at time t.

2. Interpret the parameters a_{11}, a_{12}, a_{21}, and a_{22} in Equation (3).

3. Identify situations in which the two groups are (i) mutual competitors, (ii) predator and prey, (iii) in a symbiotic relationship, and (iv) grow independently of one another. Relate these to the parameters in (3).

B. Describe each of the following terms in a sentence or two:
1 Lexis Diagram (draw it.)
2. Gompertz distribution. (Sketch one.)
3. Leslie matrix.
4. Intrinsic rate of increase
5. Length of a generation
6. Proportional hazard model
7. Survival function
8. Index of dissimilarity
9. Census survival rate
10. Marital homogamy

VI POLICY. Answer A **or** B.

A. In industrialized nations, the demographic patterns of aging and the health status of the elderly have become matters of increasing concern to policy makers. However, there exists relatively little consensus among researchers concerning the nature of the aging process or about the likely health status composition of the elderly.
1. Identify three of the main theoretical and substantive controversies.
2. Summarize the arguments and evidence for and against them.
3. Discuss implications for potential policies concerning the elderly.

B. Describe changes in age-at-first-birth since 1960. Have these trends varied by SES and race? Sketch the arguments about why these changes have occurred. Be sure to include citations when you can. Suppose the U.S. established a policy of permitting NO abortion. What would be the demographic consequences? Discuss these consequences for the nation as a whole and separately for relevant demographic groups. Justify your answer.