

DEMOGRAPHY PRELIMINARY EXAM
AUGUST 2001
AFTERNOON EXAM

IV. ANSWER EITHER A OR B.

- A. Outline a proof that a stable population has a constant age structure.
- B. Consider a closed population composed of two subgroups. Denote the size of the two groups at time t by $N_1(t)$ and $N_2(t)$ and consider the model:

$$\frac{dN_1(t)}{dt} = aN_1(t) + bN_2(t)$$

$$\frac{dN_2(t)}{dt} = cN_1(t) + dN_2(t)$$

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 .

- i. Provide a demographic interpretation of the parameters a , b , c , and d .
- ii. Identify two circumstances in which the population dynamics for the two groups are more complex than for a single homogeneous population. Explain this complexity in terms of both short- and long-term population dynamics.
- iii. Identify a substantive problem for which such a model might be applied. Explain how this model might yield different answers for your problem than more traditional models. Indicate model extensions, as appropriate.

V. ANSWER EITHER A OR B.

- A. Outline the basic forms of fertility transition theory as it emerges from the more general theory of the demographic transition. What subsequent (empirical) observations have led to modifications of this theory?
- B. Describe recent trends in fertility in the U.S. Include in your answer differentials by characteristics of the mother, e.g., age, race, ethnicity, education, and marital status. Discuss likely future trends.

VI. ANSWER EITHER A OR B.

- A. In the Baby Boom and post-Baby Boom era, major geographic rearrangements of the US population occurred. Describe the geographic mobility of the population in that era. The most recent release of Census 2000 data indicates that a new region of the United States is growing rapidly. Discuss how the new geographic growth patterns are different and speculate on what policy issues may be involved in the country and the region over the next 10-20 years.
- B. The U.S. House of Representatives recently passed legislation to abolish the so-called marriage penalty in the U.S. income system. A rationale given for this legislation is that the current tax system encourages couples not to marry. To what extent do studies of the economic determinants of marriage and/or cohabitation support this reasoning?