Stat 470, Eric Slud 4/7/04

Actuarial Mathematics: Final-Project Topics

The following is a list of *suggested* topics for a 5-page final paper or project in lieu of a final exam in the course. The paper or project will be due no later than the official exam date of Wed., May 19, 2004. The alternative to doing a paper will be a problem set of (about 10–12) past Actuarial Exam problems on the topics of the course.

The paper is to be based on at least one source such as a journal article or textbook, and is to represent some additional reading beyond the assigned reading in the course. It need not be typed.

The list below is not exhaustive: if you think of a different topic you would like to write on, please see me and I'll try to find suitable material on it for you to read.

TOPICS

(A) Statistical goodness of fit of a hypothesized 'theoretical' lifetime distribution (with or without fitted parameters). This topic would involve reading about χ^2 goodness-of-fit tests and implementing one on a survival-time data set.

(B) Estimating a survival function with the 'Kaplan-Meier Estimator': this is a standard biostatistics topic, extending life-table ideas to the case where some individuals are lost to observation or die from an uninteresting (e.g., accidental) cause.

(C) 'Graduation', or numerical interpolation and smoothing of life-table age-specific death-rates. This topic is related to smoothing splines, and would involve implementation using illustrative life-table data.

(D) 'Leslie matrices': biological/demographic models of population size, from which one can see whether a small population is likely to die out. (This topic is related to the probability topic of (Multitype) Branching Processes.)

(E) Risk-and-ruin theory, or Reinsurance. This topic involves simulation or mathematical calculations of the probability over some longer time-horizon of disastrous adverse fluctuations in survival which would cause an insurer to go bankrupt.

Of these topics, (A) & (B) are primarily statistical; (C) involves some numerical analysis; (D) involves linear algebra and a little bit of *Markov chain* theory; and (E) involves *either* a little more Markov chain and stochastic-process theory *or* a willingness to learn a little bit about simulating random insurance portfolios on the computer. (In the past, (A)-(C) have been the most popular, with (C) the clear winner.)