

Enterprise-Scale Software Development (COMP5348)

Semester 1, 2009

Tutorial Week 10

The first two questions are adapted from Gray-Reuter, ch 3.

Q1. Look at the US mortality rate statistics at

<http://www.disastercenter.com/cdc/Death%20rates%202005.html>

It states that the mortality rate for people between 20 and 25 years old was about 98 per 100,000 (that is, about 0.1%). Which measure of system failure is this similar to? What is wrong with the following argument: “a 22-year old has about 0.1% chance to die each year; therefore their average life expectancy (the time till they die) is 1000 years”?

Consider the following questions. For each, estimate an appropriate answer, using the data from the web page mentioned

- a) In a city with 100,000 22-year-olds, how many of them would be expected to die in a year? How many would be expected to die in a one-week period?
- b) What is the probability that a person celebrating their 22th birthday will survive to reach 23?
- b) If we have a club of 100 people (each 22 years old), what is the probability that there will be at least one death among the members in the coming year?
- c) If we have a club of 100 people (each 20 years old), what is the probability that at least one member will still be alive after one year?
- d) In a city with 5,000,000 people (of various ages), how many of them would be expected to die in a week?

Q2. Suppose your car has five failure modes: wreck (MTTF=20yrs; MTTR = 2 wks), mechanical (1 yr; 3 wks), electrical (3 yrs; 1 day), flat-tire (3 yrs; 1 hr), out-of-gas (3 yrs; 5 hrs). What is the overall MTTF for the car? What is the availability? What would change in these measures if we introduced a warning system that completely prevented out-of-gas from occurring?

Q3. Suppose we have a particular computer system which cost us \$10,000. The system has AFR=5% (that is, we expect only 0.05 failures per year of operation), and this system can be used to process a type of job which takes 1 hr to run. The job brings \$1 profit to us each time it runs successfully, but we have to pay compensation of \$100 to the user if the system fails during the job. What is our expected financial return from our purchase of the system? Is it financially sensible to buy a second system and set up a redundant 2-plex? How might some of the parameters change, to lead you to alter your conclusion?