

Name: _____

Problem 1 (20 Points)

Using the combinatorial model, determine the reliability of a simplex, TMR, and 5MR systems as a function of reliability of a simplex system, $R(t)$. You may assume a fault-free voter. Using MathLab, plot the reliability of the three systems versus $R(t)$ and comment on their relative reliabilities.

Problem 2 (25 Points)

A singular unit has a reliability of .95. The design specification requires an overall system reliability of .999. We are considering the following models

- a. An NMR system
- b. An N module parallel system

For each case determine the value of N.

Problem 3 (25 Points)

Using Markov model, determine the discrete solution for the reliability of a 3MR system with λ failure rate and μ repair rate. You may assume that the system initially is fault free. Using MathLab plot $R(t)$ from 0 to 500 hours using

- a. $\Delta t = 0.1$ hr, $\lambda = .01$ and $\mu = .1$
- b. $\Delta t = 0.1$ hr, $\lambda = .1$ and $\mu = .1$
- c. $\Delta t = 0.1$ hr, $\lambda = .01$ and $\mu = .01$

Problem 4(15 Points)

Using Markov model, determine the continuous solution for the reliability of a 3MR system with λ failure rate and μ repair rate. You only need to derive the s-domain solution. You may assume that the system initially is fault free.

Due 3/26/10