Name: _____

Problem One (25 Points)
Consider a random-access memory that has a word format $x_3 \, x_2 \, x_1 \, x_0$ of size 4 bits. We can use Hamming code to correct any single bit in this memory.

a) What is the H (or P) matrix?
b) Given the four syndromes s_i computed by your SEC Hamming code for single-bit errors affecting data bit x_i, $0 \leq i \leq 3$. Also give the error-free syndrome s^*.
c) Explain how you would modify the SEC code you have defined above in order to obtain an SEC/DED code.

Problem Two (25 Points)
Design a totally self-checking checker with 7 inputs.

Problem Three (25 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. Plot the reliability of the three systems versus R(t) and comment on their relative reliabilities.

Problem Four (25 Points)
Using Markov model, determine discrete solution for the reliability of a 5MR system with λ failure rate. You may assume that the system initially is fault free. Using MathLab plot R(t) for t = 5 hours and $\Delta t = 0.01$.

Due October 21, 2003