Name: _____

Problem One (20 Points)
Consider a random-access memory that has a word format $X_4\, X_3\, X_2\, X_1\, X_0$ of size 5 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, $0 \le i \le 4$. 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 (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 Three (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 5 hours using
   a. $\Delta t = 0.01$, $\lambda = .0001$ and $\mu. = .01$
   b. $\Delta t = 0.01$, $\lambda = .001$ and $\mu. = .01$
   c. $\Delta t = 0.01$, $\lambda = .0001$ and $\mu. = .001$

Due October 22, 2007