EENG 410 Homework #8

1. Assume that a BCH(15,7) two-error correcting decoder receives the message word $r=[000010000011101]$. Calculate the four syndromes over $GF(16)$:

$S_i=r(\alpha^i)$ for $i=1,2,3,4$

2. Use the Peterson-Gorenstein-Zierler BCH algorithm results for two errors to find the coefficients of the error-locator polynomial $\Lambda(X)$ over $GF(16)$:

   $\Lambda_0=1$

   $\Lambda_1=S_1$

   $\Lambda_2=\frac{S_3+S_1^3}{S_1}$

3. Perform a Chien search to find the two roots of $\Lambda(X)$ over $GF(16)$.

4. Determine the error polynomial $e(X)$.

5. Form the most likely codeword $\hat{c}=r+e$.

   Answer: $\hat{c}=[000010001011100]$

6. Verify that $\hat{c}$ is a valid codeword by calculating the four syndromes over $GF(16)$:

$S_i=\hat{c}(\alpha^i)$ for $i=1,2,3,4$

Remember with $n=15$ the various polynomials above have the form:

$f(X)=f_0+f_1X+f_2X^2+\ldots+f_{14}X^{14}$