Name: Solution.

Review Questions

- Use the generator polynomial G(X)=X^3+X+1 to construct a (1) **non-separable** and a (2) **separate** (7,4) cycle code word for data word (d3,d2,d1,d0)=1100.

(1) $V(x) = G(x) \cdot D(x)$

$= (x^3+x+1)(x^3+x^2) = x^6+x^5+x^4+x^3+x^3+x^2$

$= x^6+x^5+x^4+x^2$

Non-separable code word:

v_6	v_5	v_4	v_3	v_2	v_1	v_0
1	1	1	0	1	0	0

(2) (a) $D(x) \cdot x^{n-k} = (x^3+x^2)x^3 = x^6+x^5$

(b) Find $R(x)$:

$$\begin{array}{r|l} & x^3+x^2+x \\ \hline x^3+x+1 & x^6+x^5 \\ & x^6+x^4+x^3 \\ \hline & x^5+x^4+x^3 \\ & x^5+x^3+x^2 \\ \hline & x^4+x^2 \\ & x^4+x^2+x \\ \hline & x = R(x) \end{array}$$

(c) $V(x) = D(x)\,x^{n-k} + R(x) = x^6+x^5+x$

Code word $(d_3 d_2 d_1 d_0 r_2 r_1 r_0)$

$\underbrace{1\ 1\ 0\ 0}_{\text{Data}}\ \underbrace{0\ 1\ 0}_{\text{check bits}}$