APPENDICES

E303: Communication Systems

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An Overview of Fundamentals: PN-codes/signals & Spread Spectrum

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Appendix A: Properties of a purely random sequence

Let the sequence $\{\alpha[n]\}$ be the output of a discrete, memoryless source

INFORMATION SOURCE of $\pm$ 1s	
$\begin{cases} P(\alpha[n]=1)=0.5 \\ P(\alpha[n]=-1)=0.5 \end{cases}$	$\rightarrow \{\alpha[n]\}$

with

$$\mathcal{E}\{\alpha[n]\}=0 \qquad (=1\times 0.5\text{+(-1)}\times 0.5=0) \tag{29}$$

$$Var\{\alpha[n]\}=1 \qquad (=1^2\times 0.5\text{+(-1)}^2\times 0.5=1) \tag{30}$$

The auto-correlation of the sequence $\{\alpha[n]\}$ over M symbols is defined as follows

$$R_{\alpha\alpha}^{M}[k] \equiv \sum_{n=1}^{M}\alpha[n]\alpha[n+k]=\begin{cases}\sum_{n=1}^{M}\alpha[n]^2=\sum_{n=1}^{M}1=M & k=0\\ \text{random} & k\neq 0\end{cases} \tag{31}$$

Therefore the mean and the variance of the autocorrelation function $R_{\alpha\alpha}^{M}[k]$ are as follows

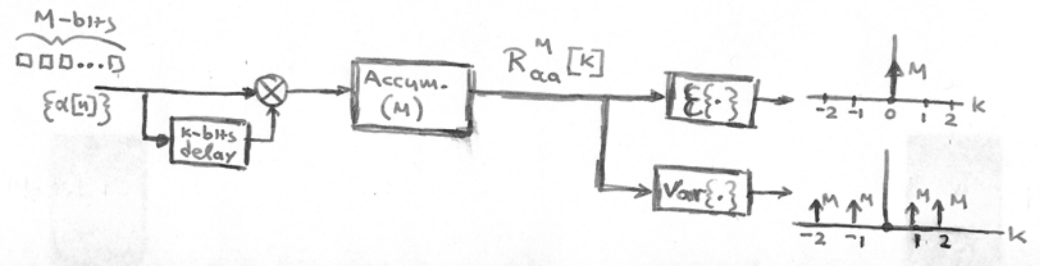
$$\mathcal{E}\{R_{\alpha\alpha}^{M}[k]\}=\sum_{n=1}^{M}\mathcal{E}\{\alpha[n]\alpha[n+k]\}=\begin{cases}\sum_{n=1}^{M}\mathcal{E}\{\alpha[n]^2\}=\sum_{n=1}^{M}1=M & \text{if } k=0\\ \sum_{n=1}^{M}\mathcal{E}\{\alpha[n]\}\mathcal{E}\{\alpha[n+k]\}=0 & \text{if } k\neq 0\end{cases} \tag{32}$$

$$\begin{aligned} Var\{R_{\alpha\alpha}^{M}[k]\} &= \mathcal{E}\{R_{\alpha\alpha}^{M}[k]^2\}-\mathcal{E}\{R_{\alpha\alpha}^{M}[k]\}^2= \\ &=\sum_{n=1}^{M}\sum_{m=1}^{M}\mathcal{E}\{\alpha[n]\alpha[n+k]\alpha[m]\alpha[m+k]\}-\mathcal{E}\{R_{\alpha\alpha}^{M}[k]\}^2= \\ &=\begin{cases}\sum_{n=1}^{M}\sum_{m=1}^{M}\mathcal{E}\left\{\alpha^2[n]\right\}.\mathcal{E}\left\{\alpha^2[m]\right\}-\mathcal{E}\left\{R_{\alpha\alpha}^{M}[0]\right\}^2=M^2-M^2=0 & \text{if } \ k=0\\ \sum_{n=1}^{M}\mathcal{E}\left\{\alpha^2[n]\right\}.\mathcal{E}\left\{\alpha^2[n+k]\right\}-\mathcal{E}\left\{R_{\alpha\alpha}^{M}[k]\right\}^2=M-0=M & \text{if } \ k\neq 0\end{cases}\end{aligned} \tag{33}$$

One may also define the cross-correlation of two sequences $\{\alpha_1[n]\}$ and $\{\alpha_2[n]\}$

$$R_{\alpha_1\alpha_2}^{M}[k]=\sum_{n=1}^{M}\alpha_1[n]\alpha_2[n+k] \tag{34}$$

Since $\{\alpha_1[n]\}$ and $\{\alpha_2[n]\}$ are independent the results are essentially the same as for the auto-correlation of $\{\alpha_1[n]\}$ with non-zero lag k. This shows that completely random sequences have nice auto- and cross-correlation properties.



Note that pure random sequences could be used as code sequences, but since the receiver needs a replica of the desired code sequence in order to despread the signal, PN sequences are used instead in practice.

Appendix B: Auto and Cross Correlation functions of two PN-sequences $\{\alpha_i[n]\}$ and $\{\alpha_j[n]\}$

- Consider the ∞-sequences of ± 1s of period N:

$$\{\alpha_i[n]\} = ..., \alpha_i[N-1], \alpha_i[N], \alpha_i[1], \alpha_i[2], ..., \alpha_i[N-1], \alpha_i[N], \alpha_i[1], ...$$

$$\{\alpha_j[n]\} = ..., \alpha_j[N-1], \alpha_j[N], \alpha_j[1], \alpha_j[2], ..., \alpha_j[N-1], \alpha_j[N], \alpha_j[1], ...$$

- Then, there are three different cross-correlation functions

◇ aperiodic cross-correlation: $$C_{\alpha_i\alpha_j}[k] \equiv \begin{cases} \sum_{n=1}^{N-k} \alpha_i[n]\alpha_j[n+k] & 0 \leq k \leq N-1 \\ \sum_{n=1}^{N+k} \alpha_i[n-k]\alpha_j[n] & 1-N \leq k \leq 0 \\ 0 & \|k\| \geq N \end{cases} \quad (35)$$

◇ periodic cross-correlation: $$R_{\alpha_i\alpha_j}[k] \equiv \sum_{n=1}^{N} \alpha_i[n]\alpha_j[n+k] \quad (36)$$

◇ odd cross-correlation function: $$\widetilde{R}_{\alpha_i\alpha_j}[k] = C_{\alpha_i\alpha_j}[k] - C_{\alpha_i\alpha_j}[k-N] \quad (37)$$

- Note that:

◇ it is easy to see that

$$R_{\alpha_i\alpha_j}[k] = C_{\alpha_i\alpha_j}[k] + C_{\alpha_i\alpha_j}[k-N] \quad (38)$$

◇ the periodic (or even) cross-correlation function has the property

$$R_{\alpha_i\alpha_j}[k] = R_{\alpha_i\alpha_j}[N-k] \quad (39)$$

◇ the name of "odd cross-correlation" function follows from the property

$$\widetilde{R}_{\alpha_i\alpha_j}[k] = -\widetilde{R}_{\alpha_i\alpha_j}[N-k] \quad (40)$$

- For a single code sequence, the corresponding autocorrelation functions have similar properties.

- For best CDMA system performance, all $C_{\alpha_i\alpha_j}[k]$, $R_{\alpha_i\alpha_j}[k]$, $\widetilde{R}_{\alpha_i\alpha_j}[k]$ should be as small as possible, since they are proportional to the interference from other users.

  The out-of-phase (i.e. for lag not equal to zero) autocorrelation functions should also be made as small as possible, since these affect the multipath suppression capabilities and the acquisition and tracking performance of the receivers.

  We thus define the peak cross-correlation parameters

$$\begin{cases} R_{\text{cross}} = \max\left\{\left\|R_{\alpha_i\alpha_j}[k]\right\|,\ \forall(i,j,k;\ i<j)\ \right\} \\ \widetilde{R}_{\text{cross}} = \max\left\{\left\|\ \widetilde{R}_{\alpha_i\alpha_j}[k]\right\|,\ \forall(i,j,k;\ i<j)\ \right\}, \\ C_{\text{cross}} = \max\left\{\left\|C_{\alpha_i\alpha_j}[k]\right\|,\ \forall(i,j,k\ ;\ i<j)\right\} \end{cases} \quad (41)$$

- Similarly we define the peak autocorrelation parameters

$$\begin{cases} R_{\text{auto}} = \max\{\left\|R^N_{\alpha_i\alpha_i}[k]\right\|,\ \forall i;\ \forall k\neq 0(\text{mod } N)\}, \\ \widetilde{R}_{\text{auto}} = \max\left\{\left\|\ \widetilde{R}^{\,N}_{\alpha_i\alpha_i}[k]\right\|,\ \forall i;\ \forall k\neq 0(\text{mod } N)\right\}, \\ C_{\text{auto}} = \max\{\left\|C^N_{\alpha_i\alpha_i}[k]\right\|,\ \forall i;\ \forall k\neq 0(\text{mod } N)\} \end{cases} \quad (42)$$

- Finally we define

$$\begin{cases} R_{\text{peak}} = \max\{R_{\text{auto}}, R_{\text{cross}}\} \\ \widetilde{R}_{\text{peak}} = \max\left\{\ \widetilde{R}_{\text{auto}}, \widetilde{R}_{\text{cross}}\right\} \\ C_{\text{peak}} = \max\{C_{\text{auto}}, C_{\text{cross}}\} \end{cases} \quad (43)$$

- With the above definitions we can see that the smaller the peak correlation parameters R_{peak}, $\widetilde{R}_{\text{peak}}$ and C_{peak}, the better the performance of a system. These parameters, however, cannot be made as small as we wish. For example, for a set of K sequences of period N, according to the Welch lower bound ,

$$R_{\text{peak}} \geq N\sqrt{\tfrac{K-1}{NK-1}} \qquad\qquad C_{\text{peak}} \geq N\sqrt{\tfrac{K-1}{2NK-K-1}} \quad (44)$$

  Therefore for large values of K and N the lower bounds on R_{peak} and C_{peak} are approximately

$$R_{\text{peak}} \geq \sqrt{N} \qquad\qquad C_{\text{peak}} \geq \sqrt{\tfrac{N}{2}} \quad (45)$$

  Moreover, it can show that

$$R^2_{\text{auto}} + R^2_{\text{cross}} > N \qquad\qquad C^2_{\text{auto}} + C^2_{\text{cross}} > \tfrac{N}{2} \quad (46)$$

  The above shows that not only is there a lower bound on the maximum correlation parameters, but also a trade-off between the peak autocorrelation and cross-correlation parameters. Thus the autocorrelation and cross-correlation functions cannot be both made small simultaneously. The design of the code sequences should be therefore very careful so that all the of above quantities of interest remain as small as possible.

Appendix C: The concept of a 'Primitive Polynomial' in GF(2) (see Appendix 4E for 'finite field' basic theory).

- Consider a polynomial $f(D)$ over the binary field GF(2): $f(D) = \underbrace{f_n}_{\neq 0} D^n + f_{n-1} D^{n-1} + \dots + f_1 D + f_0$

  The largest power of D with non-zero coef. is called ***degree*** of $f(D)$ over GF(2)

- if $\underbrace{f(D)}_{m}, \underbrace{g(D)}_{n} \in \mathrm{GF}(2)$ then $\begin{cases} f(D) + g(D) & \in \mathrm{GF}(2) \\ f(D) \,.\, g(D) & \in \mathrm{GF}(2) \end{cases}$

- ***divisible polynomial***:
  A polynomial $g(D) \in \mathrm{GF}(2)$ is said to divide $f(D) \in \mathrm{GF}(2)$ if $\exists\, h(D)$: $f(D) = h(D).g(D)$.
  Then the polynomial $f(D)$ is called divisible

- ***irreducible polynomial:***
  A polynomial $f(D) \in \mathrm{GF}(2)$ of degree m is called irreducible if $f(D)$ is not divisible by any polynomial over GF(2) of degree less than m but greater than zero.
  (or equivalently if it cannot factored into polynomials of smaller degree whose coefs are also 0 and 1 – i.e the polynomials belong to GF(2))

- two important properties of <u>irreducible</u> <u>polynomials</u>: if $f(D) = \textit{irreducible} \Rightarrow \begin{cases} f(0) \neq 0 \\ f(D) \text{ has odd number of terms} \end{cases}$

- ***primitive polynomial:***

  if $\begin{cases} f(D) = \text{irreducible (of degree } m\text{) polynomial, and} \\ f(D) \,\underline{\rfloor\, (D^k - 1)} \quad \text{i.e. } f(D) \text{ does not divide } D^k - 1 \text{ for any } k < 2^m - 1 \\ \neq 0 \end{cases}$

  then $f(D) \equiv$ *primitive polynomial*

  e.g. $D^3 + D^2 + 1 \;;\; D^4 + D + 1$

- only a small number of polynomials are *primitive*, **but** $\forall m\, \exists$ at least one *primitive* polynomial.

- examples: $f(D) = D^3 + D^2 + 1$ = *primitive*
  $f(D) = D^4 + D^2 + 1$ = *irreducible but not primitive*

Appendix 3.D: FINITE FIELD -BASIC THEORY

- Consider a set $S = \{s_1, s_2, ..., s_M\}$ having M elements.
  A finite field is constructed by defining two binary operations on the set called addition & multiplication such that certain conditions are satisfied. Addition and multiplication of two elements s_i and s_j are denoted $s_i + s_j$ and $s_i + s_j$ respectively.

- The conditions that must be satisfied for S and the two operations to be a finite field are:
  1. The addition or multiplication of any two elements of S must yield an element of S.
     That is, the set is closed under both addition and multiplication.
  2. Both addition and multiplication must be commutative $\rightarrow s_i \overset{+}{\cdot} s_j = s_j \overset{+}{\cdot} s_i$
  3. The set S must contain an **additive identity** element which will always be denoted by 0.
     $$s_i + 0 = s_i$$
  4. The set S must contain an **additive inverse** element $-s_i$ for every element s_i
     $$s_i + (-s_i) = 0$$
  5. The set S must contain a **multiplicative identity** element which will always be denoted by 1.
     $$s_i.1 = s_i$$
  6. The set S must contain a **multiplicative inverse** element s_i^{-1} for every element s_i (excluding the additive identity 0)
     $$s_i.s_i^{-1} = 1$$
  7. Multiplication must be **distributive** over addition. $\rightarrow s_i \overset{+}{\cdot} (s_j \overset{+}{\cdot} s_k) = (s_i \overset{+}{\cdot} s_j) \overset{+}{\cdot} s_k$
  8. Both addition and multiplication must be **Associative**. $\rightarrow (s_i + s_j) \cdot s_k = s_i s_k + s_j s_k$

- **EXAMPLE**
  It is easy to verify that $S = \{0, 1, 2\}$ with addition and multiplication defined as follows

modulo-3 $+$	0	1	2
0	0	1	2
1	1	2	0
2	2	0	1

modulo-3 $\times$	0	1	2
0	0	0	0
1	0	1	2
2	0	2	1

is a field of 3 elements
e.g.
additive inverse $-0 = 0$, $-1 = 2$, $-2 = 1$
multiplicative inverse $1^{-1} = 1$, $2^{-1} = 2$

- **EXAMPLE**
  It is easy also to verify that $S = \{0, 1\}$, with addition and multiplication defined as follows:

modulo-2 $+$	0	1
0	0	1
1	1	0

modulo-2 $\times$	0	1
0	0	0
1	0	1

is a field of 2 elements
e.g.
additive inverse $-0 = 0$, $-1 = 1$
multiplicative inverse $1^{-1} = 1$

- Note that $S = \{0, 1\}$ field above is the binary number field. Furthermore that addition can be performed electronically using EXCLUSIVE-OR gate and multiplication can be performed using an AND-gate.

• **An Important Result (presented without proof)**:
The set of integers $S = \{0, 1, 2, \ldots, M - 1\}$,

$$\text{where} \begin{cases} M \text{ is prime, and} \\ \text{addition and multiplication are carried out modulo-}M \end{cases}$$

is a field. These fields are called **prime fields**.

• **Subtraction and Division:**
The operations of subtraction and division are also easily defined for any field using the addition and multiplication tables, just as is done with the real-number field.
Subtraction is defined as the addition of the additive inverse and division is defined as multiplication by the multiplicative inverse.
For example for the field $S = \{0,1,2\}$ subtraction is defined by $1 + (-2) = 1 + 1 = 2$.
Similarly, $1 \div 2 = 1 \,.\, (2^{-1}) = 1.2 = 2$.

• Note that nonprime fields do not necessarily employ modulo-M arithmetic.

• Fields can be constructed having any prime number of elements p or p^m. A field having p^m elements is called an extension field of the field having p elements.

• Finite fields are often referred to as Galois fields, using the notation GF(M) for the field having M elements.

• The remainder of this discussion will be concerned exclusively with the binary number field GF(2) and its extensions GF(2^m). The reason for this is that the electronics used to implement the code generators is binary, and some of the shift register generators will be shown to generate the elements of GF(2^m)

Appendix E: Table of Irreducible Polynomials over GF(2)

(from "Error-Correcting Codes" by Peterson & Weldom MIT Press, 1972)

From : "Error-Correcting Codes"
by Peterson & Weldon
MIT PRESS , 1972.

Appendix C Tables of Irreducible Polynomials over $GF(2)$

From Table C.2 all irreducible polynomials of degree 16 or less over $GF(2)$ can be found, and certain of their properties and relations among them are given. A primitive polynomial with a minimum number of nonzero coefficients and polynomials belonging to all possible exponents are given for each degree 17 through 34.

Polynomials are given in an octal representation. Each digit in the table represents three binary digits according to the following code:

0	000	2	010	4	100	6	110
1	001	3	011	5	101	7	111

The binary digits then are the coefficients of the polynomial, with the high-order coefficients at the left. For example, 3525 is listed as a tenth-degree polynomial. The binary equivalent of 3525 is 0 1 1 1 0 1 0 1 0 1 0 1, and the corresponding polynomial is $X^{10} + X^9 + X^8 + X^6 + X^4 + X^2 + 1$.

The reciprocal polynomial of an irreducible polynomial is also irreducible, and the reciprocal polynomial of a primitive polynomial is primitive. Of any pair consisting of a polynomial and its reciprocal polynomial, only one is listed in the table. Each entry that is followed by a letter in the table is an irreducible polynomial of the indicated degree. For degree 2 through 16, these polynomials along with their reciprocal polynomials comprise all irreducible polynomials of that degree.

The letters following the octal representation give the following information:

A, B, C, D	Not primitive.
E, F, G, H	Primitive.
A, B, E, F	The roots are linearly dependent.
C, D, G, H	The roots are linearly independent.
A, C, E, G	The roots of the reciprocal polynomial are linearly dependent.
B, D, F, H	The roots of the reciprocal polynomial are linearly independent.

The other numbers in the table tell the relation between the polynomials. For each degree, a primitive polynomial with a minimum number of nonzero coefficients was chosen, and this polynomial is the first in the table of polynomials of this degree. Let α denote one of its roots. Then the entry following j in the table is the minimum polynomial of α^j. The polynomials are included for each j unless for some $i < j$ either α^i and α^j are roots of the same irreducible polynomial or α^i and α^{-j} are roots of the same polynomial. The minimum polynomial of α^j is included even if it has smaller degree than is indicated for that section of the table; such polynomials are not followed by a letter in the table.

Examples. The primitive polynomial (103), or $X^6 + X + 1 = p(X)$ is the first entry in the table of sixth-degree irreducible polynomials. If α designates a root of $p(X)$, then α^3 is a root of (127) and α^5 is a root of (147). The minimum polynomial of α^9 is $(015) = X^3 + X^2 + 1$, and is of degree 3 rather than 6.

There is no entry corresponding to α^{17}. The other roots of the minimum polynomial of α^{17} are α^{34}, $\alpha^{68} = \alpha^5$, α^{10}, α^{20}, and α^{40}. Thus the minimum polynomial of α^{17} is the same as the minimum polynomial of α^5, or (147). There is no entry corresponding to α^{13}. The other roots of the minimum polynomial $p_{13}(X)$ of α^{13} are α^{26}, α^{52}, $\alpha^{104} = \alpha^{41}$, $\alpha^{82} = \alpha^{19}$, and α^{38}. None of these is listed. The roots of the reciprocal polynomial $p_{13}^*(X)$ of $p_{13}(X)$ are $\alpha^{-13} = \alpha^{50}$, $\alpha^{-26} = \alpha^{37}$, $\alpha^{-52} = \alpha^{11}$, $\alpha^{-41} = \alpha^{22}$, $\alpha^{-19} = \alpha^{44}$ and $\alpha^{-38} = \alpha^{25}$. The minimum polynomial of α^{11} is listed as (155) or $X^6 + X^5 + X^3 + X^2 + 1$. The minimum polynomial of α^{13} is the reciprocal polynomial of this, or $p_{13}(X) = X^6 + X^4 + X^3 + X + 1$:

The exponent to which a polynomial belongs can be found as follows: If α is a primitive element of $GF(2^m)$, then the order e of α^j is

$$e = \frac{(2^m - 1)}{\mathrm{GCD}(2^m - 1, j)}$$

and e is also the exponent to which the minimum function of α^j belongs. Thus, for example, in $GF(2^{10})$, α^{55} has order 93, since

$$93 = \frac{1023}{\mathrm{GCD}(1023, 55)} = \frac{1023}{11}$$

Thus the polynomial (3453) belongs to 93. In this regard Table C.1 is useful.

Marsh (1957) has published a table of all irreducible polynomials of degree 19 or less over $GF(2)$. In Table C.2 the polynomials are arranged in lexicographical order; this is the most convenient form for determining whether or not a given polynomial is irreducible.

For degree 19 or less, the minimum-weight polynomials given in this table were found in Marsh's tables. For degree 19 through 34, the minimum-weight polynomial was found by a trial-and-error process in which each polynomial of weight 3, then 5, was tested. The following procedure was used to test whether a polynomial $f(X)$ of degree m is primitive:

Table C.1. Factorization of $2^m - 1$ into Primes.

$2^3 - 1 = 7$	$2^{19} - 1 = 524287$
$2^4 - 1 = 3 \times 5$	$2^{20} - 1 = 3 \times 5 \times 5 \times 11 \times 31 \times 41$
$2^5 - 1 = 31$	$2^{21} - 1 = 7 \times 7 \times 127 \times 337$
$2^6 - 1 = 3 \times 3 \times 7$	$2^{22} - 1 = 3 \times 23 \times 89 \times 683$
$2^7 - 1 = 127$	$2^{23} - 1 = 47 \times 178481$
$2^8 - 1 = 3 \times 5 \times 17$	$2^{24} - 1 = 3 \times 3 \times 5 \times 7 \times 13 \times 17 \times 241$
$2^9 - 1 = 7 \times 73$	$2^{25} - 1 = 31 \times 601 \times 1801$
$2^{10} - 1 = 3 \times 11 \times 31$	$2^{26} - 1 = 3 \times 2731 \times 8191$
$2^{11} - 1 = 23 \times 89$	$2^{27} - 1 = 7 \times 73 \times 262657$
$2^{12} - 1 = 3 \times 3 \times 5 \times 7 \times 13$	$2^{28} - 1 = 3 \times 5 \times 29 \times 43 \times 113 \times 127$
$2^{13} - 1 = 8191$	$2^{29} - 1 = 233 \times 1103 \times 2089$
$2^{14} - 1 = 3 \times 43 \times 127$	$2^{30} - 1 = 3 \times 3 \times 7 \times 11 \times 31 \times 151 \times 331$
$2^{15} - 1 = 7 \times 31 \times 151$	$2^{31} - 1 = 2147483647$
$2^{16} - 1 = 3 \times 5 \times 17 \times 257$	$2^{32} - 1 = 3 \times 5 \times 17 \times 257 \times 65537$
$2^{17} - 1 = 131071$	$2^{33} - 1 = 7 \times 23 \times 89 \times 599479$
$2^{18} - 1 = 3 \times 3 \times 3 \times 7 \times 19 \times 73$	$2^{34} - 1 = 3 \times 43691 \times 131071$

1. The residues of $1, X, X^2, X^4, \ldots, X^{2^{m-1}}$ are formed modulo $f(X)$.
2. These are multiplied and reduced modulo $f(X)$ to form the residue of $X^{2^m - 1}$. If the result is not 1, the polynomial is rejected. If the result is 1, the test is continued.
3. For each factor r of $2^m - 1$, the residue of X^r is formed by multiplying together an appropriate combination of the residues formed in Step 1. If none of these is 1, the polynomial is primitive.

Each other polynomial in the table was found by solving for the dependence relations among its roots by the method illustrated at the end of Section 8.1.

Table C.2. Irreducible Polynomials of Degree ≤34 over *GF*(2).

DEGREE 2	1 7H				
DEGREE 3	1 13F				
DEGREE 4	1 23F	3 37D	5 07		
DEGREE 5	1 45E	3 75G	5 67H		
DEGREE 6	1 103F	3 127B	5 147H	7 111A	9 015
11 155E	21 007				
DEGREE 7	1 211E	3 217E	5 235E	7 367H	9 277E
11 325G	13 203F	19 313H	21 345G		
DEGREE 8	1 435E	3 567B	5 763D	7 551E	9 675C
11 747H	13 453F	15 727D	17 023	19 545E	21 613D
23 543F	25 433B	27 477B	37 537F	43 703H	45 471A
51 037	85 007				
DEGREE 9	1 1021E	3 1131E	5 1461G	7 1231A	9 1423G
11 1055E	13 1167F	15 1541E	17 1333F	19 1605G	21 1027A
23 1751E	25 1743H	27 1617H	29 1553H	35 1401C	37 1157F
39 1715E	41 1563H	43 1713H	45 1175E	51 1725G	53 1225E
55 1275E	73 0013	75 1773G	77 1511C	83 1425G	85 1267E
DEGREE 10	1 2011E	3 2017B	5 2415E	7 3771G	9 2257B
11 2065A	13 2157F	15 2653B	17 3515G	19 2773F	21 3753D
23 2033F	25 2443F	27 3573D	29 2461E	31 3043D	33 0075C
35 3023H	37 3543F	39 2107B	41 2745E	43 2431E	45 3061C
47 3177H	49 3525G	51 2547B	53 2617F	55 3453D	57 3121C
59 3471G	69 2701A	71 3323H	73 3507H	75 2437B	77 2413B
83 3623H	85 2707E	87 2311A	89 2327F	91 3265G	93 3777D
99 0067	101 2055E	103 3575G	105 3607C	107 3171G	109 2047F
147 2355A	149 3025G	155 2251A	165 0051	171 3315C	173 3337H
179 3211G	341 0007				
DEGREE 11	1 4005E	3 4445E	5 4215E	7 4055E	9 6015G
11 7413H	13 4143F	15 4563F	17 4053F	19 5023F	21 5623F
23 4757B	25 4577F	27 6233H	29 6673H	31 7237H	33 7335G
35 4505E	37 5337F	39 5263F	41 5361E	43 5171E	45 6637H
47 7173H	49 5711E	51 5221E	53 6307H	55 6211G	57 5747F
59 4533F	61 4341E	67 6711G	69 6777D	71 7715G	73 6343H
75 6227H	77 6263H	79 5235E	81 7431G	83 6455G	85 5247F
87 5265E	89 5343B	91 4767F	93 5607F	99 4603F	101 6561G
103 7107H	105 7041G	107 4251E	109 5675E	111 4173F	113 4707F
115 7311C	117 5463F	119 5755E	137 6675G	139 7655G	141 5531E
147 7243H	149 7621G	151 7161G	153 4731E	155 4451E	157 6557H
163 7745G	165 7317H	167 5205E	169 4565E	171 6765G	173 7535G
179 4653F	181 5411E	183 5545F	185 7565G	199 6543H	201 5613F
203 6013H	205 7647H	211 6507H	213 6037H	215 7363H	217 7201G
219 7273H	293 7723H	299 4303B	301 5007F	307 7555G	309 4261E
331 6447H	333 5141E	339 7461G	341 5253F		
DEGREE 12	1 10123F	3 12133B	5 10115A	7 12153B	9 11765A
11 15647E	13 12513B	15 13077B	17 16533H	19 16047H	21 10065A
23 11015E	25 13377B	27 14405A	29 14127H	31 17673H	33 13311A
35 10377B	37 13565E	39 13321A	41 15341G	43 15053H	45 15173C
47 15621E	49 17703C	51 10355A	53 15321G	55 10201A	57 12331A
59 11417E	61 13505E	63 10761A	65 00141	67 13275E	69 16663C
71 11471E	73 16237E	75 16267D	77 15115C	79 12515E	81 17545C
83 12255E	85 11673B	87 17361A	89 11271E	91 10011A	93 14755C
95 17705A	97 17121G	99 17323D	101 14227H	103 12117E	105 13617A
107 14135G	109 14711G	111 15415C	113 13131E	115 13223A	117 16475C
119 14315C	121 16521E	123 13475A	133 11433B	135 10571A	137 15437G
139 12067F	141 13571A	143 12111A	145 16535C	147 17657D	149 12147F
151 14717F	153 13517B	155 14241C	157 14675G	163 10663F	165 10621A

Table C.2. Irreducible Polynomials of Degree ≤34 over *GF*(2).

DEGREE 12--CONTINUED					
167 16115G	169 16547C	171 10213B	173 12247E	175 16757D	177 16017C
179 17675E	181 10151E	183 14111A	185 14037A	187 14613H	189 13535A
195 00165	197 11441E	199 10321E	201 14067D	203 13157B	205 14513D
207 10603A	209 11067F	211 14433F	213 16457D	215 10653B	217 13563B
219 11657B	221 17513C	227 12753F	229 13431E	231 10167B	233 11313F
235 11411A	237 13737B	239 13425E	273 00023	275 14601C	277 16021G
279 16137D	281 17025G	283 15723F	285 17141A	291 15775A	293 11477F
295 11463B	297 17073C	299 16401C	301 12315A	307 14221E	309 11763B
311 12705E	313 14357F	315 17777D	325 00163	327 17233D	329 11637B
331 16407F	333 11703A	339 16003C	341 11561E	343 12673B	345 14537D
347 17711G	349 13701E	355 10467B	357 15347C	359 11075E	361 16363F
363 11045A	365 11265A	371 14043D	397 12727F	403 14373D	405 13003B
407 17057G	409 10437F	411 10077B	421 14271G	423 14313D	425 14155C
427 10245A	429 11073B	435 10743B	437 12623F	439 12007F	441 15353D
455 00111	585 00013	587 14545G	589 16311G	595 13413A	597 12265A
603 14411C	613 15413H	619 17147F	661 10605E	683 10737F	685 16355C
691 15701G	693 12345A	715 00133	717 16571C	819 00037	1365 00007
DEGREE 13	1 20033F	3 23261E	5 24623F	7 23517F	9 30741G
11 21643F	13 30171G	15 21277F	17 27777F	19 35051G	21 34723H
23 34047H	25 32535G	27 31425G	29 37505G	31 36515G	33 26077F
35 35673H	37 20635E	39 33763H	41 25745E	43 36575G	45 26653F
47 21133F	49 22441E	51 30417H	53 32517H	55 37335G	57 25327F
59 23231E	61 25511E	63 26533F	65 33343H	67 33727H	69 27271E
71 25017F	73 26041E	75 21103F	77 27263F	79 24513F	81 32311G
83 31743H	85 24037F	87 30711G	89 32641G	91 24657F	93 32437H
95 20213F	97 25633F	99 31303H	101 22525E	103 34627H	105 25775E
107 21607F	109 25363F	111 27217F	113 33741G	115 37611G	117 23077F
119 21263F	121 31011G	123 27051E	125 35477H	131 34151G	133 27405E
135 34641G	137 32445G	139 36375G	141 22675E	143 36073H	145 35121G
147 36501G	149 33057H	151 36403H	153 35567H	155 23167F	157 36217H
159 22233F	161 32333H	163 24703F	165 33163H	167 32757H	169 23761E
171 24031E	173 30025G	175 37145G	177 31327H	179 27221E	181 25577F
183 22203F	185 37437H	187 27537F	189 31035G	195 24763F	197 20245E
199 20503F	201 20761E	203 25555E	205 30357H	207 33037H	209 34401G
211 32715G	213 21447F	215 27421E	217 20363F	219 33501G	221 20425E
223 32347H	225 20677F	227 22307F	229 33441G	231 33643H	233 24165E
235 27427F	237 24601E	239 36721G	241 34363H	243 21673F	245 32167H
247 21661E	265 33357H	267 26341E	269 31653H	271 37511G	273 23003F
275 22657F	277 25035E	279 23267F	281 34005G	283 34555G	285 24205E
291 26611E	293 32671G	295 25245E	297 31407H	299 33471G	301 22613F
303 35645G	305 32371G	307 34517H	309 26225E	311 35561G	313 25663F
315 24043F	317 30643H	323 20157F	325 37151G	327 24667F	329 33325G
331 32467H	333 30667H	335 22631E	337 26617F	339 20275E	341 36625G
343 20341E	345 37527H	347 31333H	349 31071G	355 23353F	357 26243F
359 21453F	361 36015G	363 36667H	365 34767H	367 34341G	369 34547H
371 35465G	373 24421E	375 23563F	377 36037H	391 31267H	393 27133F
395 30705G	397 30465G	399 35315G	401 32231G	403 32207H	405 26101E
407 22567F	409 21755E	411 22455E	413 33705G	419 37621G	421 21405E
423 30117H	425 23021E	427 21525E	429 36465G	431 33013H	433 27531E
435 24675E	437 33133H	439 34261G	441 33405G	443 34655G	453 32173H
455 33455G	457 35165G	459 22705E	461 37123H	463 27111E	465 35455G
467 31457H	469 23055E	471 30777H	473 37653H	475 24325E	477 31251G
547 35163H	549 33433H	551 37243H	553 27515E	555 32137H	557 26743F
563 30277H	565 20627F	567 35057H	569 24315E	571 24727F	581 30331G
583 34273H	585 23207F	587 31113H	589 36023H	595 27373F	597 20737F
599 36235G	601 21575E	603 26215E	605 21211E	611 20311E	613 34003H
615 34027H	617 20065E	619 22051E	621 22127F	627 23621E	629 24465E
651 26457F	653 31201G	659 34035G	661 27227F	663 22561E	665 21615E
667 22013F	669 23365E	675 26213F	677 26775E	679 32635G	681 33631G
683 32743H	685 31767H	691 34413H	693 22037F	695 30651G	697 26565E
711 22141E	713 22471E	715 35271G	717 37445G	723 22717F	725 26505E
727 24411E	729 24575E	731 23707F	733 25173F	739 21367F	741 25161E
743 24147F	793 36307H	795 24417F	805 20237F	807 36771G	809 37327H
811 27735E	813 31223H	819 36373H	821 33121G	823 32751G	825 33523H

Compact Lecture Notes

Table C.2. Irreducible Polynomials of Degree ≤34 over *GF*(2).

DEGREE 13--CONTINUED					
839 26415E	841 23737F	843 25425E	845 34603H	851 31047H	853 37305G
855 21315E	857 35777H	859 32725G	869 20571E	871 30301G	873 34757H
875 21067F	877 25151E	1171 27513F	1173 33721G	1179 34775G	1189 23571E
1195 27411E	1197 20457F	1203 21557F	1205 30177H	1227 26347F	1229 27477F
1235 34243H	1237 27235E	1323 25175E	1325 31231G	1331 31131G	1333 25503F
1355 33045G	1357 24253F	1363 35351G	1365 26053F		
DEGREE 14	1 42103F	3 40547B	5 43333E	7 51761E	9 54055A
11 40503F	13 77141G	15 47645A	17 62677G	19 44103F	21 46425A
23 45145E	25 76303G	27 62603D	29 64457G	31 57231E	33 52737B
35 64167F	37 60153F	39 62115C	41 55753F	43 72427D	45 64715A
47 70423H	49 47153F	51 67653D	53 53255E	55 41753F	57 74247D
59 40725E	61 42667F	63 65301A	65 67517H	67 45653F	69 72501C
71 67425G	73 42163F	75 73757D	77 45555E	79 74561G	81 60523B
83 53705E	85 40123E	87 41403B	89 56625E	91 70311E	93 75547C
95 45627F	97 67335G	99 56733A	101 53253F	103 66411E	105 57745A
107 65551G	109 43017F	111 62125A	113 71073E	115 67333H	117 70677C
119 52215E	121 44177F	123 70535C	125 46327F	127 71747D	129 00203
131 61335G	133 43161E	135 46047B	137 60645G	139 40317F	141 47727A
143 65001G	145 54335E	147 76175C	149 65153H	151 50351E	153 42711A
155 41625E	157 44435E	159 41163A	161 47667F	163 41441E	165 54175A
167 45713F	169 75267H	171 72051C	173 64223H	175 42337F	177 51275A
179 65155E	181 63015E	183 57521A	185 67173H	187 50661E	189 41735A
191 50645E	193 72433F	195 47043B	197 65133H	199 53543F	201 62431A
203 42777F	205 47203F	207 46605A	209 64377H	211 73725G	213 43611A
215 42301A	217 51145E	219 44307B	221 73647H	223 74427H	225 53747A
227 45511E	229 42637F	231 63117D	233 40363E	235 75201G	237 63155C
239 72717G	241 56557F	243 75363D	245 70553F	247 66675G	249 55501A
251 60263H	261 53043B	263 75303F	265 74315E	267 66031A	269 62505G
271 60057H	273 54473A	275 60253F	277 45671E	279 71525C	281 61443E
283 64635G	285 64475C	287 67401G	289 44203F	291 50343A	293 77747H
295 54101E	297 65645A	299 41177F	301 65661A	303 42361A	305 43047F
307 45563F	309 50717A	311 53233E	313 67101G	315 62251C	317 64251E
323 40635E	325 46113E	327 44367B	329 40665E	331 63331G	333 71545C
335 73107H	337 42727F	339 43775A	341 65667E	343 61677H	345 53525A
347 52723F	349 42323F	351 41433B	353 43173E	355 46305E	357 45663B
359 71315E	361 44031E	363 73457B	365 52577E	367 52621E	369 40063B
371 52027F	373 45201E	375 77001C	377 45737E	379 64035G	381 52225A
387 00253	389 60765G	391 66545G	393 71323A	395 62767G	397 73137H
399 40145A	401 63265G	403 47551E	405 71711C	407 40353F	409 76055G
411 70065C	413 73527F	415 67201G	417 43723B	419 61251E	421 47357F
423 62261C	425 50575E	427 61267H	429 40511A	431 71721G	433 65121G
435 61053D	437 45371E	439 54627E	441 77703A	443 65057H	445 76225E
451 73071G	453 52553B	455 60025E	457 60471G	459 53513B	461 67303H
463 42763F	465 52261A	467 53657F	469 75443F	471 67267D	473 53373B
475 65165E	477 44037B	479 54737F	481 61175E	483 65031A	485 51707E
487 57627F	489 57251A	491 44073F	493 45761E	495 63463C	529 65277F
531 55247B	533 56171E	535 63513H	537 43377B	539 45641E	541 63227H
547 54243F	549 62055C	551 53061E	553 46321E	555 51431A	557 71147H
559 64053D	561 41551A	563 75521E	565 46701E	567 53763B	569 56463F
571 77057G	573 41105A	579 41171A	581 41307F	583 70425E	585 74117D
587 50135E	589 67737H	591 47615A	593 53057F	595 55103F	597 54443B
599 53051E	601 61555G	603 64157D	605 57407F	611 64653F	613 65513H
615 73603D	617 47525E	619 55165E	621 64215C	623 76377H	625 57365E
627 50557B	629 45725E	631 71301G	633 56465A	635 51745A	645 00217
647 47233F	649 53015E	651 53361A	653 46215E	655 50613E	657 77211C
659 46565E	661 44141E	663 55771A	665 71263G	667 41315E	669 62225C
675 51565A	677 76267H	679 62467H	681 64003C	683 71645G	685 76223G
687 52627A	689 70665G	691 45773F	693 64033D	695 45533E	697 50007F
699 45257B	701 45311E	707 44023F	709 72153G	711 60117D	713 46617E
715 70461G	717 47513B	719 65575E	721 56435E	723 67157C	725 71403G
727 46107F	729 65007A	731 50667B	733 55331E	739 52017F	741 51317B
743 66163F	745 70767G	747 70215C	749 76401G	751 63043H	753 63753D
755 43317F	781 77031G	783 45617B	785 52603F	787 57503F	789 63667D
791 75761G	793 60075G	795 72307B	797 51633F	803 57475E	805 61533G

Table C.2. Irreducible Polynomials of Degree ≤34 over *GF*(2).

DEGREE 14--CONTINUED					
807 60561C	809 53575E	811 62027H	813 64633C	815 67123F	817 43445A
819 73655C	821 54003F	823 62347F	825 63271C	827 71337F	837 57715A
839 54635E	841 46505E	843 64407C	845 57017E	847 54751E	849 42417A
851 57033F	853 54077F	855 45767B	857 50455E	859 62533H	861 42411A
867 74133D	869 72441G	871 43577F	873 52353B	875 55325E	877 67527G
879 75605C	881 52467F	883 61757F	885 66105C	887 51261E	889 62723D
903 00375	905 63537H	907 52457E	909 44735A	911 62413H	913 51671E
915 41001A	917 70773H	919 56031E	921 60227D	923 71345G	925 46125E
931 40655E	933 44221A	935 55323F	937 76005E	939 55435A	941 42531E
943 62671E	945 74277D	947 64617G	949 52137F	951 56637B	953 47753F
955 46773F	1093 72155G	1095 56067A	1097 63007E	1099 47111E	1101 54021A
1107 44523B	1109 54257F	1111 63567H	1113 43215A	1115 73665G	1117 45335E
1123 44147E	1125 62731C	1127 41657F	1129 77235G	1131 65643B	1133 51055E
1139 47637F	1141 40071E	1143 47771A	1161 00271	1163 57541E	1165 57107F
1171 61621G	1173 51511A	1175 57201E	1177 70251G	1179 43633B	1181 53315E
1187 44343F	1189 55705E	1191 40413B	1193 64641E	1195 44567E	1197 46451A
1203 60241C	1205 65705E	1207 71117H	1209 66703D	1211 53477F	1221 45355A
1223 74531G	1225 74607H	1227 71763C	1229 76707H	1235 60235G	1237 47673F
1239 54321A	1241 75571G	1243 77515G	1245 57611A	1251 55643B	1253 46175E
1255 74357H	1257 70267D	1259 46461E	1301 77345G	1303 51243F	1305 76151C
1307 56061E	1309 66427G	1315 54517F	1317 72465C	1319 50733F	1321 74045G
1323 71057D	1325 73143F	1331 51231E	1333 70201C	1335 77631C	1337 64021G
1351 72643H	1353 41777B	1355 71675G	1357 63073H	1363 47537E	1365 61261A
1367 65227H	1369 55073F	1371 77727B	1373 61363H	1379 43701E	1381 65147H
1383 52267B	1385 63153F	1387 72337G	1389 56607A	1395 40371A	1397 42721A
1419 00211	1421 75273F	1427 73555G	1429 67225G	1431 76617C	1433 74711E
1435 50325E	1437 70713C	1443 72513D	1445 57737F	1447 61333G	1449 40327A
1451 55111E	1453 40633F	1459 61641G	1461 65315C	1463 43647F	1465 67621G
1479 62745C	1481 41755E	1483 65727F	1485 74263D	1587 41573B	1589 55631E
1591 66405A	1593 60121C	1607 71615E	1609 77615G	1611 41447B	1613 46437F
1619 70633H	1621 65615G	1623 64605C	1625 55075E	1627 73151G	1637 75033H
1639 57327F	1641 66277D	1643 56007F	1645 55703F	1651 77277D	1677 00345
1683 57743A	1685 42645E	1687 50045E	1689 74255C	1691 53623E	1701 50477B
1703 52071E	1705 61237H	1707 67533B	1709 55417F	1715 45173E	1717 61461G
1719 43731A	1721 56717E	1735 54041E	1737 44613A	1739 70341G	1741 52065E
1747 56345E	1749 44441A	1751 76663H	1753 50777F	1755 70443D	2341 55471E
2347 53727F	2349 65637C	2355 57143B	2357 44741E	2379 67627D	2381 77177G
2387 51213E	2389 70273H	2395 62101G	2405 50241E	2411 65263H	2413 41241A
2451 00357	2453 76047H	2459 75723F	2469 73145C	2475 61377D	2477 41357F
2643 56421A	2645 76213H	2667 64213D	2709 00313	2731 41235E	2733 67605C
2739 44537B	2741 76506G	2763 65375C	2765 50721E	2771 75517H	2861 65357G
2867 47121E	5461 00007				

DEGREE 15	1 100003F	3 102043F	5 110013F	7 125253B
9 102067F	11 104307F	13 100317F	15 177775E	17 103451E
19 110075E	21 127701A	23 102061E	25 114725E	27 103251E
29 163005G	31 103437A	33 112611E	35 137733B	37 120265E
39 117423F	41 106341E	43 161007H	45 174003E	47 113337E
49 125263B	51 126007E	53 105257E	55 114467E	57 177207G
59 147047F	61 111511E	63 127635A	65 114633E	67 133663F
69 102171E	71 170465G	73 131427E	75 161615E	77 136143A
79 115155E	81 123067F	83 102561E	85 170057H	87 125235E
89 173117E	91 125747B	93 124677B	95 134531E	97 125507F
99 171737G	101 152417F	103 142305G	105 146255C	107 120043F
109 136173F	111 122231E	113 164705G	115 177757F	117 146637E
119 177535C	121 102643F	123 103145E	125 112751E	127 151537G
129 115135E	131 137067E	133 122707A	135 174443E	137 100541E
139 112703F	141 145573F	143 114273F	145 124511E	147 122563B
149 140703F	151 101361A	153 103125E	155 150451C	157 147303G
159 123023F	161 103731E	163 154463H	165 177541G	167 101561E
169 144473G	171 162375G	173 131013F	175 117767A	177 160521G
179 164727G	181 102367E	183 147363F	185 132367E	187 172431E
189 133627B	191 156333E	193 114505E	195 176561G	197 152235G
199 127143F	201 176133E	203 123075A	205 173357G	207 117143E
209 144461E	211 151447G	213 173661E	215 151043F	217 142327B

Table C.2. Irreducible Polynomials of Degree ≤34 over $GF(2)$.

DEGREE 15--CONTINUED

219 166775E	221 153143G	223 172213F	225 105213E	227 156053H
229 156745G	231 170623B	233 140373G	235 152361G	237 142157H
239 117633F	241 103605E	243 116361E	245 137523A	247 101705E
249 116135E	251 102337E	253 173515G	259 136321A	261 120447F
263 117511E	265 115141E	267 173613F	269 131735E	271 114225E
273 121125A	275 136577F	277 113227E	279 114533B	281 166151E
283 112231E	285 165033E	287 120177B	289 117547F	291 126051E
293 111335E	295 177101G	297 143703G	299 106047E	301 137427B
303 110427F	305 131211E	307 110037F	309 160511G	311 153731G
313 144275G	315 151513C	317 133775E	319 134447E	321 127347E
323 163767H	325 110717E	327 175001E	329 100377A	331 125121E
333 136237F	335 132103F	337 171035G	339 132651E	341 134105A
343 100261A	345 170227H	347 101233F	349 100445E	351 144707G
353 165355E	355 150243H	357 163353C	359 114041E	361 113025E
363 104447F	365 143301G	367 165011G	369 137361E	371 117201A
373 141655G	375 160113G	377 106715E	379 140575E	381 112123E
387 140733F	389 124243E	391 116073E	393 147321E	395 123721E
397 150225G	399 134741A	401 157111G	403 134411A	405 172317G
407 153327E	409 140573H	411 113625E	413 101673B	415 170543F
417 176735E	419 115307F	421 141635E	423 157241G	425 153005E
427 167051A	429 177175G	431 146331G	433 166541G	435 102513F
437 123121E	439 162463G	441 134037B	443 174571E	445 123433F
447 150167H	449 175465E	451 113255E	453 137325A	455 123045A
457 133571E	459 135215E	461 110221E	463 157435E	465 121437A
467 177707G	469 143501C	471 161667F	473 157427G	475 150671G
477 112407F	479 165563E	481 112053E	483 135363B	485 130617F
487 125613F	489 114713F	491 165113G	493 143733G	495 162155E
497 135017B	499 126753F	501 137765E	503 106577E	521 112113F
523 105555E	525 153425C	527 115313A	529 105761E	531 132165E
533 176147H	535 114621E	537 135751E	539 152763C	541 124757F
543 112245E	545 123221E	547 141757G	549 160547F	551 101331E
553 156065C	555 156725G	557 113373E	559 137643F	561 156237G
563 141151G	565 126015E	567 171335C	569 146717H	571 130305E
573 121355E	579 166021G	581 145361C	583 134325E	585 157155E
587 124647E	589 163761C	591 114457E	593 155243G	595 153137D
597 137253F	599 151551G	601 113645E	603 150305G	605 163745G
607 165473F	609 113057B	611 160173H	613 177663F	615 161117H
617 144115E	619 156635G	621 150633H	623 115061A	625 143253H
627 165451G	629 160305E	631 146025E	633 106751E	635 132625E
637 160553D	643 123561E	645 116637F	647 111423E	649 117107E
651 166761C	653 153555G	655 132127F	657 112333E	659 135267F
661 146727H	663 132753F	665 143343A	667 131705E	669 141005E
671 113147F	673 125323F	675 123235E	677 103653F	679 173025C
681 120661E	683 154545G	685 133553F	687 132001E	689 153773G
691 175241G	693 160237B	695 171131E	697 172415E	699 145111G
701 122603F	707 170507C	709 160757G	711 171207G	713 147553B
715 112365E	717 146111E	719 122003F	721 121273B	723 122005E
725 135401E	727 102441E	729 175515G	731 132507E	733 130223F
735 142713C	737 102615E	739 105713F	741 134241E	743 173643F
745 163617G	747 175043E	749 132051A	751 104217F	753 115523F
755 120247B	757 164447H	759 173667F	761 137051E	775 104073B
777 177065C	779 117071E	781 115537E	783 135201E	785 146643F
787 113465E	789 152263G	791 177617D	793 104755E	795 147415G
797 126001E	799 170307F	801 174425E	803 112475E	805 173263C
807 176643H	809 130303F	811 125471E	813 173711G	815 165547E
817 163723G	819 116075A	821 150677G	823 175227G	825 166407H
827 152447H	829 126205E	835 120557E	837 160335A	839 125543E
841 144377H	843 100713E	845 121251E	847 141123D	849 174517F
851 106251E	853 116277F	855 106611E	857 174563H	859 140023H
861 132037A	863 147767G	865 164531G	867 155065E	869 146263F
871 160401G	873 102057F	875 146133C	877 117021E	879 147003F
881 127723F	883 120471E	885 162455G	887 130627F	889 152135C
891 157057H	901 162153F	903 151755C	905 170277H	907 165633H
909 173105E	911 102507F	913 176037H	915 171627G	917 162171C
919 130745E	921 177517H	923 114327F	925 127167F	927 133113E

Table C.2. Irreducible Polynomials of Degree ≤34 over $GF(2)$.

DEGREE 15--CONTINUED

929 160461E	931 117137B	933 134323F	935 123361E	937 105237F
939 166737F	941 147571G	943 127743F	945 116351A	947 157315E
949 162645G	951 162403G	953 105335E	955 124767E	957 175301E
963 134755E	965 116645E	967 143307G	969 124125E	971 155261G
973 104163A	975 167753F	977 127423F	979 115667F	981 140171E
983 133041E	985 156767H	987 116037A	989 142267G	991 130635E
1057 000057	1059 104427F	1061 113075E	1063 162133H	1065 120717F
1067 144713F	1069 121605E	1071 122225A	1073 134657E	1075 130125E
1077 177621G	1079 110741E	1081 136745E	1083 152531G	1085 115455A
1091 161235G	1093 144137G	1095 140675E	1097 145277G	1099 114303B
1101 101507E	1103 115271E	1105 151735E	1107 157205G	1109 114011E
1111 171125E	1113 147071A	1115 134721E	1117 122123F	1123 104735E
1125 133011E	1127 162337A	1129 105261E	1131 101427E	1133 156563F
1135 103663E	1137 146043H	1139 151403H	1141 100157A	1143 163653E
1145 105413F	1147 143651C	1157 156157E	1159 102463F	1161 151025G
1163 176657H	1165 166425G	1167 103617E	1169 160021A	1171 161277H
1173 165565G	1175 152153F	1177 111243E	1179 165655G	1181 134165E
1187 171467H	1189 150161E	1191 122011E	1193 125403F	1195 170007H
1197 167765C	1199 103415E	1201 137703E	1203 111563F	1205 147305G
1207 156257F	1209 175177B	1211 141317B	1213 177467H	1219 140421G
1221 127071E	1223 142457F	1225 122021A	1227 146771E	1229 110211E
1231 134567F	1233 156321G	1235 114335E	1237 111603E	1239 121275A
1241 110103E	1243 127161E	1245 163273H	1251 144533F	1253 173135C
1255 155445E	1257 140441E	1259 103761E	1261 173523F	1263 167307F
1265 127457F	1267 102205A	1269 112251E	1291 106311E	1293 141633F
1295 135151A	1297 106641E	1299 102265E	1301 164453G	1303 163071G
1305 111641E	1307 134403E	1309 102667A	1315 177055E	1317 115373F
1319 150231G	1321 175651G	1323 160377B	1325 136063E	1327 101073F
1329 165303G	1331 116675E	1333 140221A	1335 100201E	1337 103223B
1339 105415E	1341 122445E	1347 143631E	1349 137441E	1351 104421A
1353 154023H	1355 127225E	1357 176427H	1359 151265C	1361 150215E
1363 144225G	1365 115205A	1367 123307E	1369 133437E	1371 166653E
1373 101515E	1379 126023B	1381 166553H	1383 172701E	1385 140271G
1387 121143E	1389 111577E	1391 132747E	1393 143057C	1395 111137B
1397 127401E	1399 150317E	1401 177731G	1415 155335G	1417 123057F
1419 117715E	1421 162657B	1423 171745G	1425 130527F	1427 144467G
1429 115045E	1431 177115G	1433 155751G	1435 103767A	1437 115127E
1443 176741E	1445 141475G	1447 112553E	1449 154307D	1451 105621E
1453 170051G	1455 147707F	1457 160445A	1459 161031E	1461 131405E
1463 164121A	1465 111003F	1467 167331E	1469 165311G	1475 157405G
1477 140557A	1479 156655G	1481 164561G	1483 114231E	1485 106407F
1487 111033F	1489 172123G	1491 146667D	1493 143523G	1495 170765G
1497 105725E	1499 132155E	1501 150261G	1507 122517E	1509 107567E
1511 166267E	1561 153461C	1563 166011G	1565 133445E	1571 156365G
1573 176111G	1575 137331A	1577 165407G	1579 106445E	1581 145551C
1583 124341E	1585 127215E	1587 135005E	1589 117731A	1591 110141E
1593 152345G	1595 164441G	1605 172621G	1607 143567G	1609 153443H
1611 146203E	1613 120417F	1615 103553F	1617 110567A	1619 126067F
1621 140747F	1623 107037F	1625 135503E	1627 126735E	1629 172445G
1635 117131E	1637 105173F	1639 105071E	1641 174167G	1643 114745A
1645 133407A	1647 136215E	1649 153113H	1651 141321E	1653 132523F
1655 136335E	1657 167255E	1671 146301G	1673 131265A	1675 120133F
1677 157557E	1679 107711E	1681 174751E	1683 133257F	1685 151217G
1687 144653C	1689 176203H	1691 155213H	1693 135207F	1699 131367F
1701 146543C	1703 130033F	1705 166311A	1707 150213G	1709 143227F
1711 176013G	1713 147751G	1715 131543B	1717 131111E	1719 111267F
1721 144151G	1723 110433F	1733 171173F	1735 116367F	1737 115421E
1739 112223F	1741 111635E	1743 157165C	1745 135223F	1747 106143F
1749 176015G	1751 142461G	1753 154233E	1755 114677F	1757 103363A
1763 150327F	1765 126325E	1767 126105A	1769 111713F	1771 172303B
1773 170763G	1775 124175E	1777 176357F	1807 164667E	1809 136611E
1811 163123E	1813 151037D	1815 121431E	1817 110165E	1819 172005G
1821 104265E	1827 154763A	1829 152703D	1831 163555G	1833 135021E
1835 124071E	1837 164247H	1839 166113H	1841 101625A	1843 145427H
1845 106633F	1847 155437E	1849 174633H	1851 161657H	1861 174605G

Table C.2. Irreducible Polynomials of Degree ≤34 over $GF(2)$.

DEGREE 15--CONTINUED

1863 136701E	1865 144425E	1867 126747F	1869 157441C	1871 167015E
1873 142737H	1875 152301E	1877 131727E	1879 120221E	1881 102147E
1883 106457B	1885 152253H	1891 157645A	1893 141541G	1895 170325E
1897 141677C	1899 102733E	1901 135443F	1903 124251E	1905 150731G
1907 127137F	1909 100347F	1911 130415A	2185 147161G	2187 154247F
2189 161205G	2195 101313E	2197 175203F	2199 154507G	2201 121055A
2203 113061E	2205 170211C	2211 102763E	2213 167367H	2215 106503F
2217 133641E	2219 160175C	2221 161061E	2227 103035E	2229 173037F
2231 130737F	2233 166137C	2235 130017F	2245 122213F	2247 144577D
2249 117027F	2251 106273F	2253 107217F	2259 146373F	2261 153445C
2263 145727D	2265 121451A	2267 146607F	2269 113543F	2275 161013A
2277 177131G	2279 112633E	2281 137545E	2283 140227F	2285 112377F
2323 123163F	2325 100725A	2327 162315G	2329 155027G	2331 173551C
2333 132357F	2339 141231E	2341 117457F	2343 143403H	2345 124005A
2347 137601E	2349 143271G	2355 143727F	2357 107447F	2359 136401A
2361 157711G	2363 170337E	2373 166257D	2375 131733E	2377 176453H
2379 116057F	2381 156773H	2387 114371A	2389 155505G	2391 100641E
2393 151573E	2395 106713F	2397 177751G	2403 175601G	2405 177563G
2407 155175G	2409 170367G	2411 132015E	2413 126375E	2419 170433F
2421 151747G	2443 173153B	2445 111505E	2451 127243F	2453 107323F
2455 106745E	2457 165327B	2459 153577H	2461 150341G	2467 155737H
2469 150005G	2471 146007A	2473 146155E	2475 117655E	2477 101023E
2483 126227F	2485 173163B	2487 103175E	2489 105143F	2491 174743G
2501 101433F	2503 155757H	2505 121017F	2507 100425E	2509 126657E
2515 172363H	2517 120463E	2519 154561G	2601 126771E	2603 156161E
2605 147725G	2611 177527D	2613 121641E	2615 111365E	2617 125057E
2631 142611G	2633 110435E	2635 104575A	2637 164313G	2643 126163E
2645 112347F	2647 126155E	2649 131667F	2651 141365G	2653 116307B
2659 143531E	2661 141445E	2663 104141E	2665 167001G	2667 110343A
2669 111047F	2675 107121E	2677 106125E	2699 167203G	2701 175337F
2707 165201G	2709 106767B	2711 152351G	2713 144731G	2715 161043G
2717 113171E	2723 133533A	2725 175405G	2727 177231G	2729 127653E
2731 165535G	2733 114701E	2739 146177H	2741 121327E	2743 132277F
2745 153175G	2759 155407A	2761 145433H	2763 167463H	2765 104263A
2771 127437F	2773 176255E	2775 134435E	2777 124335E	2779 143373D
2781 170501G	2787 126711E	2789 103257E	2791 120601E	2793 155773B
2839 134255E	2841 103737F	2843 164001G	2845 161147F	2851 135565E
2853 110573E	2855 175711E	2857 116631E	2859 131623E	2861 155725G
2867 154537F	2869 114347B	2871 140755G	2873 113515E	2887 120155E
2889 160137E	2891 163647B	2893 121725E	2899 157255G	2901 141401G
2903 141125G	2905 107337A	2907 117125E	2909 144603H	2915 147635E
2917 154331G	2919 115607A	2921 154411E	2923 154155E	2925 122275E
2931 136457F	2957 126433F	2963 154515E	2965 150371G	2967 173331E
2969 146753E	2971 132741E	2973 145477H	3171 000073	3173 124115E
3175 127365E	3177 107645E	3179 117443F	3181 163335E	3187 115675E
3213 131651A	3219 170523H	3221 167313H	3223 137127F	3225 140205E
3227 102357B	3237 163365G	3239 172027H	3241 131165A	3243 162241E
3245 142223G	3251 164155G	3253 176753H	3255 152433B	3257 125271E
3271 177377G	3273 100647E	3275 121101E	3277 142751E	3283 115721A
3285 144437G	3287 177443H	3289 101613F	3291 142633H	3301 156527H
3355 165725E	3365 110405E	3367 107675A	3369 115133E	3371 101551E
3373 133213E	3379 155621C	3381 114363A	3383 161253F	3385 160413F
3399 127077E	3401 136213E	3403 171115E	3405 121553E	3411 140007G
3413 116601E	3415 147437H	3417 100223E	3419 126643E	3429 133231E
3431 162037H	3433 141027E	3435 125255E	3437 166275A	3475 171621G
3477 107373E	3479 125337A	3481 110255E	3483 114611E	3493 114055A
3495 110501E	3497 104111E	3499 146375G	3501 126557F	3507 125361A
3509 121617F	3511 103333F	3513 103053E	3527 171371E	4681 000013
4683 133261A	4685 123735E	4691 142175G	4693 131645E	4699 167637G
4709 155303H	4715 160215G	4717 163275G	4755 124053F	4757 133201E
4763 141115G	4773 161105E	4779 100021E	4781 116567B	4787 145675G
4789 123471E	4811 137613F	4813 105701E	4819 121305E	4821 146705E
4907 124621A	4909 122443E	4915 123537E	4917 124317F	4939 106677E
4941 160723H	4947 131601E	4949 113405A	4955 155517G	5285 000045
5291 155707H	5293 134277F	5299 140513C	5301 111041A	5323 127273F

Table C.2. Irreducible Polynomials of Degree ≤34 over $GF(2)$.

DEGREE 15--CONTINUED

5325 117243F	5331 141707H	5333 134205E	5419 107417F	5421 122401E
5427 170037E	5429 107127E	5451 161465E	5453 171027C	5459 174707H
5461 145453E				

DEGREE 16	1 210013F	3 215435A	5 227215A	7 234313F
9 225657B	11 233303F	13 307107H	15 311513D	17 336523D
19 307527H	21 363501C	23 306357H	25 353573D	27 357333D
29 201735E	31 272201E	33 310327D	35 304341C	37 242413F
39 327721C	41 270155E	43 302157H	45 374111C	47 210205E
49 305667H	51 237403B	53 236107F	55 212113B	57 314061C
59 271055E	61 313371G	63 333575C	65 267313B	67 311405G
69 323527D	71 346355G	73 350513H	75 237421A	77 203213F
79 233503F	81 261105A	83 306221G	85 267075A	87 235063B
89 244461E	91 204015E	93 327421C	95 226455A	97 202301E
99 351641C	101 376311G	103 201637F	105 365705C	107 352125G
109 273435E	111 202545A	113 243575E	115 251645A	117 277535A
119 327277D	121 250723F	123 340047D	125 274761A	127 226135E
129 357047D	131 214443F	133 277213F	135 315633D	137 300205G
139 367737H	141 230535A	143 342567H	145 265157B	147 371771C
149 217137F	151 262367F	153 301663D	155 370565C	157 201045E
159 304731C	161 303657H	163 212653F	165 245351A	167 347433H
169 260237F	171 311651C	173 256005E	175 206353B	177 362053D
179 352603H	181 310017H	183 333013D	185 256415A	187 376175C
189 243513B	191 312301G	193 260475E	195 347211C	197 215345E
199 201551E	201 362555C	203 333643H	205 304261C	207 230541A
209 250311E	211 333117H	213 274317B	215 301425C	217 247353F
219 254601A	221 212063B	223 207661E	225 317171C	227 214215E
229 322661G	231 274635A	233 326035G	235 200215A	237 324127D
239 230653F	241 342105G	243 305471C	245 242437B	247 363637H
249 330561C	251 211473F	253 266663F	255 361617D	257 000717
259 255517F	261 344733D	263 311155G	265 340207D	267 273211A
269 366421G	271 221257F	273 207753B	275 226315A	277 250017F
279 243111A	281 242225E	283 204703F	285 323563D	287 230451E
289 323341C	291 271725A	293 353263H	295 306575C	297 271251A
299 335227H	301 213375E	303 340333D	305 232013B	307 312405G
309 233017B	311 266701E	313 262351E	315 324141C	317 365221G
319 213651E	321 200365A	323 215613B	325 207221A	327 323077D
329 274627F	331 302335G	333 251211A	335 262421A	337 360667H
339 223133B	341 356255G	343 337553H	345 215015A	347 221213F
349 276531E	351 325413D	353 362737H	355 240171A	357 241173B
359 274353F	361 222563F	363 231753B	365 227065A	367 217451E
369 254471A	371 356221G	373 235275E	375 372075C	377 357527H
379 241341E	381 335263D	383 311515G	385 202155A	387 254241A
389 370137H	391 300405C	393 227157B	395 237733B	397 207717F
399 303375C	401 257051E	403 245367F	405 324631C	407 274621E
409 211101E	411 324755C	413 326261G	415 236555A	417 341343D
419 220625E	421 332745G	423 374163D	425 264255A	427 234015E
429 206635A	431 320731G	433 243631E	435 325757D	437 241677F
439 217473F	441 366373D	443 230355E	445 301653D	447 264433B
449 302321G	451 333323H	453 344045C	455 317163D	457 265401E
459 325033D	461 341667H	463 276645E	465 346725C	467 301535G
469 342325G	471 202265A	473 247617F	475 325475C	477 343213D
479 237351E	481 341741G	483 361353D	485 260665A	487 276727F
489 273141A	491 233743F	493 252023B	495 272423B	497 265617F
499 273015E	501 267421A	503 351353H	505 377171C	507 317357D
517 202703F	519 241245A	521 356057H	523 217633F	525 277215A
527 257643B	529 267507F	531 311661C	533 235145E	535 202411A
537 205003B	539 366155G	541 212115E	543 375437D	545 354377D
547 236511E	549 277745A	551 241251E	553 211571E	555 245733B
557 362633H	559 201031E	561 371643D	563 340311G	565 200751A
567 232211A	569 341345G	571 374721G	573 310745C	575 227063B
577 271161E	579 322367D	581 375213H	583 330073H	585 273007B
587 341147H	589 371427H	591 200451A	593 251741E	595 345267D
597 205143B	599 212355E	601 252623F	603 331627D	605 241175A
607 355507H	609 261177B	611 317203H	613 361541G	615 363211C

Table C.2. Irreducible Polynomials of Degree ≤ 34 over $GF(2)$.

DEGREE 16--CONTINUED

617 366345G	619 337521G	621 362745C	623 366171G	625 204227B
627 222473B	629 233725A	631 346101G	633 261253B	635 354723D
637 262073F	643 206603F	645 317531C	647 215343F	649 311203H
651 221245A	653 324747H	655 301065C	657 223561A	659 232643F
661 363271G	663 253723B	665 260145A	667 337071G	669 273361A
671 224611E	673 267615E	675 377373D	677 316431G	679 237337F
681 214143B	683 272071E	685 364225C	687 230371A	689 240675E
691 306643H	693 366537D	695 233521A	697 325173D	699 241647B
701 244333F	703 311733H	705 222123B	707 234777F	709 304535G
711 202141A	713 256461E	715 374343D	717 341061C	719 375761G
721 323175G	723 236041A	725 260725A	727 222017F	729 352077D
731 231253B	733 330233H	735 210447B	737 324073H	739 306015G
741 316757D	743 302115G	745 322031C	747 226255A	749 351225G
751 344623H	753 211125A	755 337017D	757 302063H	759 375223D
761 303361G	763 313751G	765 366557D	771 000573	773 326137H
775 256553B	777 223463B	779 302577H	781 234667F	783 225405A
785 201717B	787 230257F	789 357617D	791 367333H	793 346243H
795 272445A	797 325723H	799 311103D	801 310267D	803 330177H
805 302635C	807 372301C	809 246613F	811 264507F	813 341043D
815 275357B	817 301101G	819 262135A	821 350403H	823 367033H
825 301347D	827 201607F	829 202607F	831 212737B	833 232315A
835 201367B	837 222003B	839 223121E	841 200475E	843 221151A
845 316261C	847 245265E	849 226447B	851 234155E	853 305235G
855 222267B	857 335105G	859 227475E	861 362577D	863 224671E
865 356471C	867 223255A	869 301213H	871 321453H	873 341645C
875 350277D	877 240315E	879 220343B	881 343503H	883 366673H
885 337063D	887 225733F	889 221101E	891 343547D	893 231265E
899 315737H	901 300733D	903 270403B	905 271347B	907 356741G
909 260775A	911 204343F	913 225051E	915 332655C	917 276241E
919 244251E	921 311165C	923 201771E	925 305263D	927 337547D
929 234545E	931 261141E	933 374765C	935 335205C	937 303463H
939 356233D	941 256243F	943 373053H	945 204025A	947 346467H
949 256653F	951 310671C	953 274757F	955 247275A	957 277047B
959 332663H	961 367231G	963 233035A	965 355155C	967 352653H
969 213625A	971 320225G	973 323547H	975 276031A	977 213253F
979 226073F	981 201153B	983 373363H	985 352123D	987 367065C
989 301451G	991 262233F	993 373553D	995 270253B	997 263737F
999 214267B	1001 217237F	1003 257507B	1005 365501C	1007 205535E
1041 343055C	1043 344651G	1045 211245A	1047 306573D	1049 264001E
1051 343655G	1053 201515A	1055 370743D	1057 313415G	1059 307713D
1061 320445G	1063 222425E	1065 243043B	1067 214371E	1069 370321G
1071 265231A	1073 365405G	1075 305301C	1077 364355C	1079 312615G
1081 300155G	1083 333177D	1085 341703D	1091 370275G	1093 267205E
1095 325731C	1097 376443H	1099 332033H	1101 266167B	1103 326461G
1105 244547B	1107 212647B	1109 322171G	1111 206257F	1113 277641A
1115 310517D	1117 312247H	1119 365307D	1121 310437H	1123 344513H
1125 302167D	1127 337245G	1129 247743F	1131 275141A	1133 216607F
1135 317567D	1137 255355A	1139 353153D	1141 222633F	1143 254543B
1145 211377B	1147 243135E	1149 377147D	1155 253207B	1157 337311G
1159 272175E	1161 222541A	1163 226367F	1165 324433D	1167 360623D
1169 315713H	1171 337503H	1173 326065C	1175 207307B	1177 232045E
1179 337517D	1181 353733H	1183 372435G	1185 333515C	1187 213523F
1189 200535E	1191 262263B	1193 273073F	1195 264463B	1197 347463D
1199 364201G	1201 240411E	1203 274167B	1205 362715C	1207 253603B
1209 262615A	1211 360141G	1213 315571G	1219 303045G	1221 362161C
1223 301407H	1225 251705A	1227 215615A	1229 316505G	1231 373237H
1233 214317B	1235 370541C	1237 313437H	1239 275651A	1241 361701C
1243 214663F	1245 313407D	1247 216313F	1249 271655E	1251 265663B
1253 376415G	1255 213325A	1257 355771C	1259 306235G	1261 214157F
1263 256401A	1265 272627B	1267 216777F	1269 313627D	1271 206173F
1273 361521G	1275 333733D	1285 000433	1287 264637B	1289 326317H
1291 276441E	1293 273253B	1295 341037D	1297 326715G	1299 216007B
1301 217041E	1303 222237F	1305 224107B	1307 202277F	1309 256063B
1311 240323B	1313 260655E	1315 266671A	1317 273765A	1319 377755G
1321 264037F	1323 370611C	1325 300643D	1327 335675G	1329 350057D

Table C.2. Irreducible Polynomials of Degree ≤ 34 over $GF(2)$.

DEGREE 16--CONTINUED

1331 353531G	1333 303367H	1335 331751C	1337 335127H	1339 354413H
1341 314651C	1347 372705C	1349 346047H	1351 325647H	1353 255113B
1355 277341A	1357 252657F	1359 226075A	1361 353025G	1363 340065G
1365 375517D	1367 334347H	1369 225575E	1371 324711C	1373 245025E
1375 371227D	1377 225551A	1379 343145G	1381 242167F	1383 243411A
1385 247027B	1387 230365E	1389 321165C	1391 254515E	1393 367671G
1395 242115A	1397 220217F	1399 361563H	1401 301553D	1403 352365G
1405 204351A	1411 263047B	1413 261551A	1415 375627D	1417 205273F
1419 227577B	1421 331353H	1423 200677F	1425 205237B	1427 317441G
1429 377405G	1431 205335A	1433 213631E	1435 263003B	1437 330543D
1439 243375E	1441 303013H	1443 255655A	1445 203207B	1447 245255E
1449 353045C	1451 353135G	1453 215007F	1455 302131C	1457 205423F
1459 331577H	1461 327471C	1463 245313F	1465 245247B	1467 323715C
1469 255527F	1475 256311A	1477 333755G	1479 247377B	1481 224725E
1483 355403H	1485 315407D	1487 262471E	1489 324523H	1491 302737D
1493 374471G	1495 207675A	1497 330343D	1499 330023H	1501 261765E
1503 376451C	1505 237271A	1507 265553F	1509 251325A	1511 203303F
1513 374277D	1515 374573D	1517 250737F	1519 266745E	1521 342177D
1523 255505E	1549 241317F	1551 277347B	1553 255653F	1555 224655A
1557 246455A	1559 277565E	1561 367743H	1563 240233B	1565 307563D
1567 277053F	1569 254651A	1571 213075E	1573 263407F	1575 307533D
1577 275247F	1579 202753F	1581 256517B	1583 323113H	1585 216551A
1587 371051C	1589 254551E	1591 302257H	1593 342001C	1595 252313B
1597 316145G	1603 272207F	1605 253317B	1607 223043F	1609 355513H
1611 210233B	1613 277663F	1615 335645C	1617 355147D	1619 225573F
1621 366057H	1623 243217B	1625 337225C	1627 354503H	1629 337577D
1631 364445G	1633 370145G	1635 216177B	1637 330673H	1639 271341E
1641 317373D	1643 334555G	1645 255751A	1647 312411C	1649 212423B
1651 354047H	1653 241767B	1655 351157D	1657 342721G	1659 214053B
1669 267221E	1671 307541C	1673 334533H	1675 323145C	1677 211767B
1679 236423F	1681 325275G	1683 372057D	1685 327373D	1687 277505E
1689 272713B	1691 317361G	1693 347361G	1695 220433B	1697 354231G
1699 216477F	1701 311337D	1703 220741E	1705 324015C	1707 264271A
1709 231361E	1711 254323F	1713 302505C	1715 245417B	1717 212137B
1719 360721C	1721 217671E	1723 301021G	1725 321573D	1731 363525C
1733 272267F	1735 263401A	1737 215545A	1739 204141E	1741 276117F
1743 322515C	1745 213165A	1747 244425E	1749 212065A	1751 300135C
1753 277145E	1755 332415C	1757 360545G	1759 376475G	1761 252015A
1763 261455E	1765 333525C	1767 346335C	1769 310215G	1771 210435E
1773 201557B	1775 201373B	1777 210733F	1779 204235A	1781 203603F
1783 201155E	1785 214461A	1799 000703	1801 244035E	1803 261117B
1805 271563B	1807 242305E	1809 225735A	1811 240741E	1813 232435E
1815 262253B	1817 227647F	1819 352577D	1821 215171A	1823 343011G
1825 375333D	1827 313647D	1829 226117F	1831 326571G	1833 341523D
1835 341117D	1837 235151E	1839 344435C	1841 351021G	1843 330523H
1845 321507D	1847 347111G	1849 355323H	1851 367701C	1853 322643D
1859 341337H	1861 312471G	1863 307521C	1865 321735C	1867 303435G
1869 344203D	1871 202463F	1873 262645E	1875 233215A	1877 256353F
1879 344153H	1881 330235C	1883 247511E	1885 354415C	1887 316365C
1889 322111G	1891 314507H	1893 251765A	1895 226613B	1897 346145G
1899 333061C	1901 327337H	1903 225523F	1905 221173B	1907 205745E
1909 273235E	1911 371625C	1913 274571E	1915 227353B	1925 253215A
1927 331333H	1929 273703B	1931 270557F	1933 370467H	1935 350763D
1937 335717H	1939 211123F	1941 207163B	1943 322601G	1945 265101A
1947 377623D	1949 234675E	1951 200627F	1953 344615C	1955 372351C
1957 300025G	1959 216455A	1961 215411E	1963 333221G	1965 320151C
1967 277707F	1969 201435E	1971 333265C	1973 343335G	1975 300557D
1977 305567D	1979 355735G	1981 240477F	2115 331173D	2117 272425E
2119 234711E	2121 361707D	2123 213067F	2125 262271A	2127 363543D
2129 241757F	2131 326423H	2133 253125A	2135 342643D	2137 321433H
2139 251271A	2141 346173H	2147 211305E	2149 361371G	2151 246721A
2153 356561G	2155 222715A	2157 315225C	2159 361055C	2161 323055G
2163 214773B	2165 271215A	2167 266347F	2169 301321C	2171 232405E
2181 323157D	2183 324661G	2185 215233B	2187 215103B	2189 310003H
2191 311427H	2193 351701C	2195 365051C	2197 335477H	2199 227311A

(degree 16,17)

Table C.2. Irreducible Polynomials of Degree ≤ 34 over $GF(2)$.

DEGREE 18	1 1000201E	3 1010301A	5 1002241E
7 1000377B	9 1200205A	11 1703601G	13 1025711E
15 1015721A	17 1115701E	19 1023141A	21 1070477B
27 1223215A	63 1313133B	63 1313133B	63 1313133B
189 1623075C	57 1160435A	57 1160435A	171 1626367D
57 1160435A	171 1626367D	171 1626367D	133 1300565A
399 1514245C	399 1514245C	1197 1052465A	399 1514245C
1197 1052465A	1197 1052465A	73 1642365C	219 1252555A
219 1252555A	657 1253607A	219 1252555A	657 1253607A
657 1253607A	1971 1334325A	511 1231145A	1533 1055321A
1533 1055321A	4599 1341035A	1533 1055321A	4599 1341035A
4599 1341035A	13797 1777777D	1387 1011011A	9709 1001001A
DEGREE 19	1 2000047F	3 2020471E	5 2013211E
7 2570103F	9 2561427F	11 2227023F	13 2001711E
15 2331067F	17 3146455G	19 3610353H	21 2766447F
DEGREE 20	1 4000011E	3 4000017B	5 4200031A
7 4001051E	9 4040217B	11 4030071A	13 4004515E
15 4221037B	17 6000031G	19 4442235E	21 4103307B
25 4307165A	75 4266075A	33 4036267B	55 4346037B
165 5145217B	55 4346037B	165 5145217B	275 6027135C
825 6044073D	31 4034755A	93 4627377B	155 4367471A
465 5057137B	155 4367471A	465 5057137B	775 6505453D
2325 4504241A	341 4510031A	1023 7552557D	1705 6406005C
5115 5327265A	1705 6406005C	5115 5327265A	8525 5746331A
25575 6647133D	41 4027577B	123 4761757B	205 5541427A
615 7113055C	205 5541427A	615 7113055C	451 7544237D
1353 7602777D	2255 5017111A	6765 5521623B	2255 5017111A
6765 5521623B	1271 7050457D	3813 4345543B	6355 6130725C
19065 7164555C	6355 6130725C	19065 7164555C	13981 4100001A
41943 4102041A			
DEGREE 21	1 10000005E	3 10040205E	5 10020045E
7 11111115A	9 10040315E	11 10000635E	13 10103075E
15 10050335E	17 10002135E	19 17000075G	21 14600067D
49 11105347A	127 10225077A	889 11166743A	889 11166743A
6223 17155161C	337 10264425A	2359 16260075C	2359 16260075C
42799 10040001A			
DEGREE 22	1 20000003F	3 20100403B	5 20001043F
7 22222223F	9 20100453B	11 25200127F	13 20401207F
15 20110517B	17 20430607F	19 20070217F	21 31400147D
23 20005611A	69 20465307B	89 20603715A	267 24146477B
2047 22404051A	6141 36544657D	683 34230073D	15709 21774413B
60787 34603145C			
DEGREE 23	1 40000041E	3 40404041E	5 40000063F
7 40010061E	9 50000241E	11 40220151E	13 40006341E
15 40405463F	17 40103271E	19 41224445E	21 40435651E
47 44636045A	178481 43073357B		

DEGREE 24	1 100000207F	3 100205645A
5 100305143B	7 100315361A	9 102746675A
11 125245661E	13 113646571A	15 112432273B
17 140775753D	19 113763063E	21 116636645A
45 170736335C	63 164260065C	35 113206017A
105 151255377B	105 151255377B	315 105404647B
39 156267123C	39 156267123C	117 131307443B
65 150051747D	195 132365525A	195 132365525A
585 157653375C	91 160503563D	273 137240727A
273 137240727A	819 144534331C	455 165330327D
1365 103446341A	1365 103446341A	4095 120652605A
51 155212435A	51 155212435A	153 130633327B
85 141720423C	255 172634307C	255 172634307C

Table C.2. Irreducible Polynomials of Degree ≤ 34 over $GF(2)$.

DEGREE 24--CONTINUED		
765 146537231C	119 123426525A	357 105732145A
357 105732145A	1071 133125511A	595 155513755A
1785 121720647B	1785 121720647B	5355 102474621A
221 100466513A	663 100006161A	663 100006161A
1989 101312015A	1105 126751351A	3315 104313243A
3315 104313243A	9945 116055567A	1547 156652045C
4641 124430435A	4641 124430435A	13923 112630407A
7735 127617123A	23205 133033563B	23205 133033563B
69615 161676707A	241 174317125C	723 171224435C
723 171224435C	2169 154423127D	1205 132001371A
3615 145363733B	3615 145363733B	10845 155353415A
1687 165365701C	5061 106342635A	5061 106342635A
15183 100605077B	8435 133567111A	25305 161276343B
25305 161276343B	75915 100140053B	3133 101332157B
9399 131342727B	9399 131342727B	28197 162047171C
15665 112155405A	46995 164117115C	46995 164117115C
140985 124055647B	21931 110001011A	109655 100011011A
DEGREE 25	1 200000011E	3 200000017F
5 204000051E	7 200010031E	9 200402017F
11 252001251E	13 201014171E	15 204204057F
17 200005535E	19 200014731E	21 201015517F
31 200523477B	601 353551603D	18631 277267355A
1801 341573647D	55831 253566335A	
DEGREE 26	1 400000107F	3 401007131A
5 430216473F	7 402365755E	9 410004563B
11 426225667F	13 510664323F	15 475477275A
17 473167545E	19 411335571E	21 433154447B
2731 656536753D	8191 614326143D	24573 600777003D
DEGREE 27	1 1000000047E	3 1001007071E
5 1020024171E	7 1004462703B	9 1102210617E
11 1250025757F	13 1257242631E	15 1020560103F
17 1112225171E	19 1037530241E	21 1006524347B
73 1215076703A	511 1745602367D	
DEGREE 28	1 2000000011E	3 2000000017B
5 2040000411A	7 2104210431E	9 2002004017B
11 2000025051E	13 2020006031E	15 2040404017B
17 2002502115E	19 2001601071E	21 2104213577A
29 2010141305A	87 2010073021A	145 2112310701A
435 2256267705A	43 2043450123B	129 2232610673B
215 3417321145C	645 2507013341A	1247 2036150345A
3741 2742450341A	6235 2052124143B	18705 2307251163B
113 2065561561A	339 2550100465A	565 3662526717D
1695 3655737253B	3277 2752435573B	9831 3521653421A
4859 2313475717B	14577 3513705403A	24295 2517460277B
72885 2037216263B	140911 2336561121A	422733 3043320155A
127 2243345037B	381 3540233367A	635 3664406015C
1905 3757051033D	3683 2322031441A	11049 3157336171C
18415 2226143443B	55245 3033453267C	5461 3305002225C
16383 2273447351A	27305 3061505731C	81915 3052445243D
158369 3533324373D	475107 2337253731A	791845 2145723745A
2375535 2330160331A	14351 3316136351C	43053 2374475053A
71755 3175417143A	215265 3514237073C	416179 2755450655A
1248537 3657555473D	617093 3614772157D	1851279 3572445367D
3085465 3706175715C	9256395 3777777777D	
DEGREE 29	1 4000000005E	3 4004004005E
5 4000010205E	7 4010000045E	9 4400000045E
11 4002200115E	13 4001040115E	15 4004204435E
17 4100060435E	19 4040003075E	21 4004064275E
233 4125377665A	1103 4663771561A	256999 7260572607D
2089 6202672631C	486737 6276417701C	2304167 4334123375A

Table C.2. Irreducible Polynomials of Degree ≤ 34 over $GF(2)$.

DEGREE 30		1	10040000007F	3	10045207405A
5	10104264207F	7	17254401747D	9	10466404155A
11	10421106467B	13	10115131333F	15	12531150265A
17	11326212703F	19	10343244533E	21	14340746005C
63	15671207425A	33	10617013661A	33	10617013661A
99	10231077101A	77	10347066511A	231	12551521353B
231	12551521353B	693	12363365205A	31	10537567431A
93	13104273407B	93	13104273407B	279	17565561725C
217	13063776443B	651	14475010377C	651	14475010377C
1953	16217747517D	341	15312176137D	1023	13005472403B
1023	13005472403B	3069	15027200513D	2387	17327131755A
7161	17273014127A	7161	17273014127A	21483	15222475661C
151	11732145645A	453	15642307235C	453	15642307235C
1359	13137001367A	1057	17576155211A	3171	14046056527C
3171	14046056527C	9513	15362114071A	1661	16275156545A
4983	11747625331A	4983	11747625331A	14949	14262504223C
11627	12305126253B	34881	11274077671A	34881	11274077671A
104643	16671210137D	4681	11346765601A	14043	15727555211C
14043	15727555211C	42129	11154174627A	32767	14271111643D
98301	17313775157D	98301	17313775157D	294903	17667776677D
51491	15116464137C	154473	10170400463B	154473	10170400463B
463419	13637044253B	360437	13726766575A	1081311	14437537423D
1081311	14437537423D	3243933	17657537277D	331	13214207735A
993	15100727503B	993	15100727503B	2979	11115104367B
2317	10737311047B	6951	12374572221A	6951	12374572221A
20853	11567732701A	3641	14707036127B	10923	16076273661C
10923	16076273661C	25487	10403615303A	76461	10221305567A
76461	10221305567A	10261	16150525151C	30783	10363607103A
30783	10363607103A	92349	12553152637A	71827	14221266525C
215481	17473760245C	215481	17473760245C	646443	17070134445A
112871	12527647623A	338613	12670030647A	338613	12670030647A
790097	12105065527A	2370291	10545323161A	2370291	10545323161A
49981	10400014607B	149943	10502035235A	149943	10502035235A
449829	12240170427B	349867	10101010111A	549791	11303560025A
1649373	15735076321C	1649373	15735076321C	3848537	11010100111A
1549411	12135356633B	4648233	11274767701A	4648233	11274767701A
13944699	16471647235C	10845877	11000100011A		
DEGREE 31		1	20000000011E	3	20000000017E
5	20000020411E	7	21042104211E	9	20010010017E
11	20005000251E	13	20004100071E	15	20202040217E
17	20000200435E	19	20060140231E	21	21042107357E
DEGREE 32		1	40020000007F	3	40001114005A
5	50521021747B	7	40460216667F	9	40220536125A
11	40035532523F	13	42003247143F	15	42644424505A
17	44165166133B	19	41760427607F	21	56032357221A
51	73274317525C	85	55255004227B	255	60537314115C
257	52213142567B	771	46633742135A	1285	53046115123B
3855	47254550703B	4369	45052437233B	13107	71265756301C
21845	65636126613D	65535	57410204175A		
DEGREE 33		1	100000020001E	3	100020024001E
5	104000420001E	7	100000260001A	9	100020224401E
11	111100021111E	13	100000031463F	15	104020466001E
17	100502430041E	19	100601431001E	21	100034327001A
23	100021260105A	161	107167672771A	89	100123140475A
623	124155341567B	2047	142560223461C	14329	150052442055C
599479	125725100311A	13788017	101534661265A	53353631	107753475213B
DEGREE 34		1	201000000007F	3	201051003005A
5	201472024107F	7	377000007527H	9	203123311035A
11	225213433257F	13	227712240037F	15	213753015051A
17	251132516577F	19	211636220473F	21	377235535321C
43691	327304565547D	131071	331706543633D	393213	226405640551A