Misprints and corrections

p.6 The last 2.5 lines in the proof of Theorem 1.2.1 should be:
Change $\lceil \frac{d}{2} \rceil$ of the nonzero positions to zeroes to obtain y. Then $d(0,y) \leq d - \lceil \frac{d}{2} \rceil \leq t$ and $d(c,y) = \lceil \frac{d}{2} \rceil \leq \lceil \frac{2t}{2} \rceil = t$, but $0 + y = c + (y - c)$ so the code is not t-error correcting.

p.6 just after Lemma 1.2.3 : Lemma 1.2.3 should be Lemma 1.2.2

p. 14 Problem 1.5.8 : Example 1.1.2 should be Example 1.1.4

p. 26 line -6 $(a_0, a_1, \ldots, a_m)$ should be $(a_0, a_1, \ldots, a_m) \neq (0, 0, \ldots, 0)$

p.27-28 Theorem 2.3.6 and proof $i \in c_j$ should be $i \in C_j$ and $f_j(x)\mathbb{F}_2[x]$ should be $f_j(x) \in \mathbb{F}_2[x]$, $(\beta^j)^i$ should be β^i.

p. 28 Algorithm 2.3.1 step 4 $i \in c_j$ should be $i \in C_j$

p. 36 Figure 3.1 Caption l.8 $s = 1$ should be $l = 1$

p. 46 l.12 $\frac{w}{N}$ should be $\frac{w}{n}$.

p. 50 l.12 Theorem 2.2.1 should be Theorem 2.2.2.

p. 52 l.13 $\sum_{j=1}^{l_1} Q_{1,j}$ should be $\sum_{j=0}^{l_1} Q_{1,j}$

P. 53 Example 5.2.1 The received vector should be $r = (5, 9, 0, 9, 0, 1, 0, 7, 0, 5)$ and 11 unknowns should be 12 unknowns.

p.55 the polynomial $P^{(S)}(x)$ should have been:

$$P^{(S)}(x) = \sum_{r=1}^{t} p_r^{(S)} x^r = (-1)^{t-S} x \prod_{m=1, m \neq s}^{t} (x - x_{i_m}) \quad (1)$$

The last part of the proof should be:
$= x_{i_1} \cdots x_{i_{s-1}} \cdot x_{i_{s+1}} \cdots x_{i_t} \prod_{1 \leq l < s < j \leq t} \left(x_{i_j} - x_{i_l} \right) (-1)^{t-S} x \prod_{m=1, m \neq s}^{t} (x - x_{i_m})$
by Corollary 5.3.1 and hence

$d = x_{i_1} \cdots x_{i_{s-1}} \cdot x_{i_{s+1}} \cdots x_{i_t} \prod_{1 \leq l < s < j \leq t} \left(x_{i_j} - x_{i_l} \right) P^{(s)}(x)$
so by replacing the x^j with S_j the claim follows. □

p.57 l.16 Section 5.2 should be Section 5.3

p.57-60. Here we suppose that d is odd.If d is even l_1 should be replaced with $l_1 - 1$.

p.61 (Example 5.2.1) should be (Example 5.2.1 continued)

p.61 Example 5.4.1 the error polynomial should be $x^9 + 3x^3$ and $c(x) = r(x) - e(x)$

p.67 Example 6.3.1 last line , last sentence should be "and this is the true minimum distance, since $g(x) = x^9 + x^6 + 1$".

p.79 l.6: $\frac{37}{64} = 0.58$ should be $\frac{36}{64} = 0.56$

p.85 after Definition 8.1.5 $(M+1)n$ should be $(M+1)\frac{n}{k}$ and kM should be M

p.87 line 19 after "reversing g" add "Note that the reversal should include all blocks affected so for an odd $m+1$, the length of the g sequence is extended by 1."

p.88 Example 8.3.2 line 7 length 5 should be length 6

p.88 Definition 8.3.2 last line should be "where s_j is calculated only for the $n-k$ parity positions in each n-block, and where $s_j = 0$ if r is a codeword."

p.89 line 21 $j = \lfloor R(N' - m) \rfloor$ should be $j = \lfloor R(N' - m - 1) \rfloor + k$

p.89 Lemma 8.4.1 "decreasing" should be "non-increasing"

p.90 lines 9 and 10 Lemma 8.4.1 should be Lemma 8.4.2

p.90 Theorem 8.4.2 $j = \lfloor R(N' - m) \rfloor$ should be $j = \lfloor R(N' - m - 1) \rfloor + k$

p.90 Example 8.4.1 replace "(11,1), (14,2), (17,3)" with "(12,1), (15,2), (18,3)" and the upper bound is now 10 instead of 9

p.91 replace $\sum_{i \geq 0} G_i u_{j-i}$ with $\sum_{i \geq 0} u_{j-i} G_i$

p.93 after (8.5) "$k - m$ by m matrix" should be "$k - m$ by n matrix".

p.96 Problem 8.8.8 1) should be: Show that g_0 is irreducible, while g_1 factors into two irreducible polynomials.

p.96 Problem 8.8.9 1) "binary" should be "irreducible".

p.97 Chapter 9. The methods and definitions in this chapter are only for codes with rate $R = 1/n$. Similar concepts may be used for codes with $R = k/n$, but we prefer to create such codes by puncturing as shown in Section 8.5.

p.98 Example 9.1.2 The matrix should be:

$$\Phi = \begin{bmatrix} 00 & - & 11 & - \\ 11 & - & 00 & - \\ - & 10 & - & 01 \\ - & 01 & - & 10 \end{bmatrix} \tag{2}$$

p.99 Lemma 9.1.3 "length N" should be "length K".

p. 101 Example 9.1.4 The system of equations should be:

$$\begin{bmatrix} 0 & 0 & z^2 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & z & 0 & z \\ 0 & z & 0 & z \end{bmatrix} \begin{bmatrix} \rho_0 \\ \rho_1 \\ \rho_2 \\ \rho_3 \end{bmatrix} = \begin{bmatrix} \rho_0 \\ \rho_1 - z^2 \\ \rho_2 \\ \rho_3 \end{bmatrix} \tag{3}$$

p.102 lines 8 and 11 r should be r_j.

p.102 line 11 add "Symbols punctured away should not be considered in the calculation. In this way the following Algorithm 9.2.1 may also be applied to punctured codes with rates $R = k/n$ for $k \neq 1$"

p 103 line 4 $P[r]$ should be $P[r_j]$

p 103 4 to 5 lines before (9.5) "2^k" should be "two"

p.103 (9.5) $\mu_{i'}(j-1)$ should be $\mu_i(j-1)$

p.105 Figure 9.1. $\mu_1(j)$ under $j = 3$ should be 5. $\mu_2(j)$ and $\mu_3(j)$ under $j = 4$ should be 7 and 6. The last two lines under 5 6 7 should be 6 4 8 and 7 7 7.

p.105 Figure 9.1 Caption "between time 4 and 5" should be "between time 3 and 4" p.107 Problem 9.3.3 4) $A = BC^*$ should be $A = BC\star$

p.110 lines 9-10 "A minimum distance codeword of weight d_1 ..." should be "A codeword of minimum weight d_1 ..."

p.113 $P(t) = e^{\mu}$.. should be $P(t) = e^{-\mu}$

p.120 Lemma 11.1.1 " For all $i \geq -1$" should be For all $i \geq 0$.

p.121 l.16 $S(X)$ should be $S(x)$

p. 122 lines 2-17 should be replaced by: The syndromes are $S_1 = r(\alpha) = 1 + \alpha + \alpha^2 + \alpha^4 = \alpha^2$
$S_2 = {S_1}^2 = \alpha^4$
$S_3 = r(\alpha^3) = 1 + \alpha^3 + \alpha^6 + \alpha^{12} = \alpha^9$
$S_4 = {S_2}^2 = \alpha^8$
$S_5 = r(\alpha^5) = 1 + \alpha^5 + \alpha^{10} + 1 = \alpha^5$
$S_6 = {S_3}^2 = \alpha^3$
We therefore have $S(x) = \alpha^2x^5 + \alpha^4x^4 + \alpha^9x^3 + \alpha^8x^2 + \alpha^5x + \alpha^3$.

The Euclidian algorithm on x^6 and S(x) gives:

i	g_i	r_i	q_i
-1	0	x^6	-
0	1	$\alpha^2x^5 + \alpha^4x^4 + \alpha^9x^3 + \alpha^8x^2 + \alpha^5x + \alpha^3$	-
1	$\alpha^{13}x + 1$	$\alpha^3x^4 + \alpha^5x^3 + \alpha^{13}x^2 + \alpha^2x + \alpha^3$	$\alpha^{13}x + 1$
2	$\alpha^{12}x^2 + \alpha^{14}x + 1$	$\alpha^8x^3 + \alpha^{10}x^2 + \alpha x + \alpha^3$	$\alpha^{14}x$
3	$\alpha^7x^3 + \alpha^9x^2 + \alpha^9x + 1$	$\alpha^7x^2 + \alpha^{14}x + \alpha^3$	$\alpha^{10}x$

From this we see that $j = 3$ and $g_3(x) = \alpha^7x^3 + \alpha^9x^2 + \alpha^9x + 1$, which has α^5, α^8 and α^{10} as zeroes, so the error vector is $x^{10} + x^8 + x^5$ and the codeword is therefore $1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$ ($= g(x)$).

p.122 Example 11.2.2 S_4 should be $S_4 = ... = \alpha^6$

p.123 the last line should be:

$$P^{(S)}(x) = \sum_{r=1}^{t} P_r^{(S)} x^r = (-1)^{t-S} x \prod_{l=1, l\neq S}^{t} (x - x_{i_l}) \tag{4}$$

and

$$S_r = \sum_{j=1}^{t} e_{i_j} x_r^{i_j}. \tag{5}$$

p.124 line 6 should be:

$$g_j'(x_{i_S}) = \prod_{l=1, l\neq S}^{t} (x - x_{i_l}) = x_{i_S}^{-1}(-1)^{(t-S)} P^{(S)}(x_{i_S}) \tag{6}$$

p. 124 lines 10-14 should be: and therefore
$r_j(x) = \prod_{l=1}^{t} (x - x_{i_l}) \sum_{i=1}^{2t} S_i x^{2t-i} \bmod x^{2t}$

$= (-1)^{t-S} P^{(S)}(x) x^{-1} (x - x_{i_S}) \sum_{i=1}^{2t} S_i x^{2t-i} \bmod x^{2t}$

$=(-1)^{t-S} (x - x_{i_S}) \sum_{i=1}^{2t} \sum_{r=1}^{t} P_r^{(S)} x^{r-1} S_i x^{2t-i} \bmod x^{2t}$

and hence

$$r_j(x_{i_S}) = -(-1)^{(t-S)} \sum_{r=1}^{t} x_{i_S}^{2t} P_r^{(S)} S_r \tag{7}$$

and the result follows.□

p.124 line 4 from below: e_1 should be $e_1 = (1)^{-7}.. = \alpha$.

p.128 l.21 condition (12.2) should be condition 2

p.128 (12.3) ≥ 0 should be > 0

p.128 (12.4) $\leq$ should be $<$.

p.129 last line of Algorithm 12.1.1 should be $d(f(x_1), f(x_2), \ldots, f(x_n)), (r_1, r_2; \ldots, r_n)) \leq \tau$

p.130 l.19 "<=" should be "="

p.130 l. -7 w_i should be r_i
p.131 (12.5) $\geq$ should be $>$

p.131 (12.6) $\leq$ should be $<$

p.131 (12.9) $\leq$ should be $<$.

p.131 l.-4 $l > a$ or $b > l_a$ should be $b > l$ or $a > l_a$

p.131 line 8 from below Gurusami should be Guruswami.

p.131 l.-2 $Q_{j,r}$ should be $Q_{r,j}$.

p.132 l.2 $< \tau$ should be $\leq \tau$

p.133 l.-13 $\alpha^{10}x^{10}$ should be $\alpha^2 x^{10}$

p.133 l.-2"$\alpha^{11} + x^6$ should be $\alpha^{11}x^6$

p.137 l.-1 " row indices" should be " row indices u"

p.138 l.1 "column indices such that $h_{uv} = 1$ for v in J_u" should be " column indices v such that $h_{uv} = 1$ for row u"

p. 140 l.20 the sentence i.e..... is superfluous and can be deleted.

p.141 l.6 symbol node ν should be symbol node v.

p.142 l.7 $a_v(c_v)) = r_v + 1$ should be $a_v(x) = r_v + x$

p.148 Example 13.4.1 $a(j)$ should be a_j , μ_1 and μ_2 should be m_1 and m_2.

p.152 line 16 from above: the scond type of points should be $(\alpha^{i+j(q-1)}, \beta_i)$

p. 152 l.-3 $\rho : \mathbb{F}_{q^2}[x, y]$ should be $\rho : \mathbb{F}_{q^2}[x, y] \to \mathbb{N}_0$

p.154 line 9 from below: The element in the last sum should be: $(\alpha^{i+j(q-1)})^{a_1+a_2}$.

p.154 line 5 from below: The element in the first sum should be $\alpha^{i(a_1+a_2)}$.

p.155 Example 14.1.1 $s = 10, 11, \ldots, 50$ should be $s = 11, 12, \ldots, 51$.

p.156 l.6 " and .....then have" should be deleted.

p.156 l.7, l.17 and l.18 $r(P_j)$ should be r_j

p.157 Problem 14.3.5 Theorem 14.4.1 should be Lemma 14.4.1

p.160 (A.4) change signs in the two terms.

p.163 Problem 1.5.2 3) should be $G(111111)^T = (110)^T \neq (000)$.

p.165 Problem 1.5.9 1) g_{34} should be 1

p.165 Problem 1.5.10 1) $d^* = d$ if all minimum weight words have a zero in the deleted position, else $d^* = d - 1$
2) $d^* \geq d$.

p.165 Problem 1.5.11 H_c should be H

p 170 Problem 5.5.2 2) The last two columns of G should be:

$$\begin{matrix} 6 & 2 \\ 2 & 2 \\ 2 & 5 \\ 5 & 6 \end{matrix}$$

p.171 Problem 5.5.3 1) The second coordinate of the sum should be α^4.
p.172 Problem 6.5.3) H should have been:

$$H = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 \end{bmatrix}$$

p.173 Problem 8.8.1 1) should have been: 11.10.10.10.00.00.10.11

p.174 Problem 8.8.2 3) should have been: 001.010.011.001.101

p.174 Problem 8.8.4 should have been:
1)

$$H = \begin{bmatrix} 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

2) Yes

p.175 Problem 8.8.7 should have been: 1) For the code of Problem 8.8.1:
$G = (1 + D + D^3, 1 + D^2 + D^3)$
$H = (1 + D^2 + D^3, 1 + D + D^3)$
for the code of problem 8.8.2:
$G = (1 + D + D^2, 1 + D^2, 1 + D)$

$H = \begin{bmatrix} 1+D & 1+D^2 \\ 0 & 1+D \end{bmatrix}$

p.175 Problem 8.8.8 should have been: 1) $g_1(D) = (1+D)(1+D+D^3)$
2) short information sequences give weight at least 3 from g_0 and at least 4 from g_1.
3) The encoded sequence is 11.10.10.00.00.00.10.11.00 and has weight 7.
4) 3.

p.180 Problem 12.4.1 2) should be $\tau \leq 10$!

p.180 Problem 12.4.2 k should be 5 and $l = 3$ gives $\tau \leq 17$.

p.181 Problem 12.4.3 2) The first matrix should have 10 rows, the ninth should be :139541.

p.181 last line The second codeword is $(0, 0, 6, 9, 1, 6, 1, 8, 2, 9)$

p.182 Problem 13.5.1 The parity bits should be (0011001001)

p. 183 Problem 14.3.1 4) should be. $H(27)^{\perp} = H(47)$

p.183 Problem 14.3.5 The last 4 lines should be: with $h = 1$. So ..
$\sum_{i=0}^{q-2} \alpha^{i(q+1)} \sum_{\beta^q+\beta=\alpha^{i(q+1)}} \beta^{b_1+b_2}$

$=\sum_{i=0}^{q-2} \alpha^{i(q+1)} (\alpha^{i(q+1)})^{b_1+b_2} \sum_{\beta^q+\beta=1} \beta^{b_1+b_2}$

$= \frac{\alpha^{(q+1)(1+b_1+b_2)(q-1)}-1}{\alpha^{(q+1)(1+b_1+b_2)}-1} \sum_{\beta^q+\beta=1} \beta^{b_1+b_2} = 0$,when the denominator is nonzero,

In the remaining case we get with $1 \leq a \leq q-1$
$-\sum_{\beta^q+\beta=1} \beta^{a(q-1)-1} = -\sum_{\beta^q+\beta=1} \beta^{(a-1)q+q-a-1} = -\sum_{\beta^q+\beta=1} (\beta^{q-a-1})(1-\beta)^{a-1} = -\sum_{\beta^q+\beta=1} (\beta^{q-a-1}) \sum_{j=0}^{a-1} \binom{a-1}{j} (-1)^{a-1-j} \beta^{q-2-j} = 0$

since $\sum_{\beta^q+\beta=1} \beta^s = 0$ when $s < q-1$ as we will now prove:
$\sum_{\beta^q+\beta=1} \beta^s = \sum_{\alpha^q+\alpha=0} (\gamma+\alpha)^s$,where γ is a fixed element with $\gamma^q+\gamma = 1$. So we get:
$\sum_{\alpha^q+\alpha=0} (\gamma+\alpha)^s$
$= \sum_{\alpha^q+\alpha=0} \sum_{j=0}^{s} \binom{s}{j} \gamma^{s-j} \alpha^j$
$= \sum_{j=0}^{s} \binom{s}{j} \gamma^{s-j} \sum_{\alpha^q+\alpha=0} \alpha^j$
$= 0$

p.185 line 6 from above: 1. should be : 1. Choose the field, by choosing m.

p.194 line 7 from below in the second column insert Viterbi algorithm 104.