Aufgabe 17

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

a)

1. $C_{Ex-127,8}(93) = C_{2,8}(136)$

$= 10001000$

2. $C_{Ex-127,8}(12) = C_{2,8}(139)$

$= 10001011$

3.

$(0111\ 1111)\ C_{Ex-127,8} = C_{Ex-127,8}(127) = 0$

4. $(1010\ 1001)\ C_{Ex-127,8} = C_{Ex-127,8}(169) = 42$

5. $C_{Ex-127,8}(-111) = C_{2,8}(16) = 00010000$

6. $(0110\ 0110)\ C_{Ex-127,8} = C_{Ex-127,8}(108) = -19$

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

b)

1. $C_{Ex-127,8}(13) \oplus C_{Ex-127,8}\ C_{Ex-127,8}(-13)$

$= C_{2,8}(140) \oplus C_{2,8}(114) - C_{2,8}(127)$

$= 1\,000\,1100 \oplus 0\,111\,001C - C_{2,8}(127)$ $\quad \begin{array}{r} 1000\ 1100 \\ +\ 0111\ 001C \\ \hline 1111\ 1110 \end{array}$

$= 1111\ 111C - 0111\ 1111$

$= (0111\ 1111)\, C_{Ex-127,8} = C_{Ex-127,8}(0)$

2. $C_{Ex-127,8}(72) \ominus C_{Ex-127,8}\ C_{Ex-127,8}(-31)$

$= C_{2,8}(199) \ominus C_{Ex-127,8}\ C_{2,8}(96)$ $\quad \begin{array}{r} 1100\ 0111 \\ -\ 011C\ 0000 \\ \hline 011\,0\ 0111 \end{array}$

$= 1100\ 0111 - 011C\ 0000 + 0111\ 1111$

$= 011C\ 0111 + 0111\ 1111$

$= (1110110)_{C_{EX-127,8}} = C_{EX-127,8}(103)$

3.

$1001\ 0110 \oplus C_{EX-127,8}\ 0101\ 0101$

$= 1001\ 0110 + 0101\ 0101 - 0\ 111\ 1111$

$= 1110\ 1011 - 0\ 111\ 1111$

$= (0110\ 1100)_{C_{EX-127,8}} = C_{EX-127,8}(-19)$

4. $10010110 \ominus_{C_{Ex-127,8}} 01010101 =$

$10010110 - 01010101 + 0111\ 1111$

$= 0100\ 0001 + 0111\ 1111$

$= (1100\ 0000)_{C_{Ex-127,8}} = C_{Ex-127,8}(GS)$

Aufgabe 18

a)

1. $c_{FK\ 4,4}(0.25) = c_{2,4}(rd(0.25 \cdot 2^4))$

$= c_{2,4}(4) = 0100$

2. $c_{FK\ 4,4}(0.7) = c_{2,4}(rd(11,2)) = c_{2,4}(11)$

$= 1011$

3. $c_{FK\ 4,4}(0.6) = c_{2,4}(rd(9,6)) = c_{2,4}(10)$

$= 1010$

4. $(c_{FK\ 4,4}(0.6))_{FK\ 4,4} = (1010)_{FK\ 4,4} = c_{FK\ 4,4}(0.625)$

5. $(0111)_{FK\ 4,4} = c_{FK\ 4,4}(0.4375)$

b)

1. $c_{FK\ 4,4}(0.4) \oplus_{FK\ 4,4} c_{FK\ 4,4}(0.1) =$

$c_{2,4}(6) \oplus_{FK\ 4,4} c_{2,4}(2)$

$= 0110 \oplus_{FK\ 4,4} 0010 = (1000)_{FK\ 4,4} = c_{FK\ 4,4}(0.5)$

2.

$$1001 \oplus_{FK\ 4,4} 0011 = (1100)_{FK\ 4,4} = C_{FK\ 4,4}(0.625)$$

3. $1001 \ominus_{FK\ 4,4} 0011 = (0110)_{FK\ 4,4} = C_{FK\ 4,4}(0.375)$

d) 1. $|0,3 - (C_{FK\ 4,4}(0.3))_{FK\ 4,4}| = |0,3 - (C_{2,4}(5))_{FK\ 4,4}|$

$= |0,3 - (0101)_{FK\ 4,4}| = |0,3 - 0,3125| = 0,0125$

2. $|0.2+0.6 - (C_{FK\ 4,4}(0.2) \oplus_{FK\ 4,4} C_{FK}(0.6))_{FK\ 4,4}|$

$= |0.8 - (C_{2,4}(3) \oplus_{FK\ 4,4} C_{2,4}(10))_{FK\ 4,4}|$

$= |0.8 - (0011 \oplus_{FK\ 4,4} 1010)_{FK\ 4,4}|$

$= |0.8 - (1101)_{FK\ 4,4}| = |0.8 - 0,8125| = 0.0125$

3. $C_{FK\ S2\ S2}^{(m-1)}$

4. $2^{-4} = 0.0625$

5. mindestens 6 Bit

- bei $k = 4$ und $k = 5$ liegt der absolute RF bei 0.0125
- bei $k = 6$ liegt er bei unter 0.01

6.

$$|0.8 - (C_{FK\,4,4}(0.8))_{FK\,4,4}| = |0.8 - (C_{2,4}(13))_{FK\,4,4}|$$

$$= |0.8 - (1101)_{FK\,44}| = |0.8 - 0.8125| = 0.0125$$

Aufgabe 13

a) 1. $17.5 = 1.09375 \cdot 2^4$

2. $0.021 = 1.344 \cdot 2^{-6}$

b) $C_{GK\,11,16}(0.3)$

Zahl normieren: $0.3 = 1.2 \cdot 2^{-2}$

VZB: 0

$q = 2^{16-11-1} - 1 = 15$

$C_{Ex\,15,5}(-2$