

# **Grundlagen der Betriebssysteme**

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## 1.1 Aufgabe 1

(a)

$$89/2 = 44 \text{ Rest } 1$$

$$44/2 = 22 \text{ Rest } 0$$

$$22/2 = 11 \text{ Rest } 0$$

$$11/2 = 5 \text{ Rest } 1$$

$$5/2 = 2 \text{ Rest } 1$$

$$2/2 = 1 \text{ Rest } 0$$

$$1/2 = 0 \text{ Rest } 1$$

$$\Rightarrow 89_{10} = 1011001_2$$

(b) Zuerst Umrechnung ins Dezimalsystem um Division zu erleichtern:

$$32_7 = 3 * 7^1 + 2 * 7^0 = 23_{10}$$

$$23/5 = 4 \text{ Rest } 3$$

$$4/5 = 0 \text{ Rest } 4$$

$$\Rightarrow 32_7 = 43_5$$

(c)

$$4360_{10} = 4096_{10} + 256_{10} + 8_{10} = 2^{12} + 2^8 + 2^3 = 1000100001000_2$$

(d)

$$\begin{array}{rcl} 1414215376_8 & & = \\ 001\ 100\ 001\ 100\ 010\ 001\ 101\ 011\ 111\ 110_2 & & = \\ 1100\ 0011\ 0001\ 0001\ 1010\ 1111\ 1110_2 & & = \\ C\ 3\ 1\ 1\ A\ F\ E & & \end{array}$$

## 1.2 Aufgabe 2

(a)

$$CAFFEE_{16} = 14\ 12\ 17\ 17\ 16\ 16_8 = 141217171616_8$$

(b)

$$3072 = 2048 + 1024 = 2^{11} + 2^{10} = 110000000000_2$$

(c)

$$1724656_8 = 001\ 111\ 010\ 100\ 110\ 101\ 110_2 = 01111\ 01010\ 01101\ 01110_2 = F\ A\ D\ E_{32}$$

(d)

$$1316_2 = 1024 + 256 + 32 + 4 = 2^{10} + 2^8 + 2^5 + 2^2 = 10100100100_2$$

### 1.3 Aufgabe 3

(a)

$$\begin{array}{r} 1011001_2 \\ + 11000_2 \\ \hline 11 \\ \hline =1110001_2 \end{array}$$

(b)

$$\begin{array}{r} 101101_2 \\ + 1011111_2 \\ \hline 1111111 \\ \hline =10001100_2 \end{array}$$

(c)

$$\begin{array}{r} 1001100_2 \\ + 1100010_2 \\ \hline 1 \\ \hline =10101110_2 \end{array}$$

(d)

$$\begin{array}{r} 101011_2 \\ + 110111_2 \\ \hline 111111 \\ \hline =1100010_2 \end{array}$$

### 1.4 Aufgabe 4

(a)

$$\begin{aligned} 2018_{10} &= 00000111\ 11100010_2 \\ -2018_{10} &= 11111000\ 00011101_2 + 1 \\ &= 11111000\ 00011110_2 \end{aligned}$$

(b)

$$\begin{aligned} 27346_{10} &= 01101010 \ 11010011_2 \\ -27346_{10} &= 10010101 \ 00101100_2 + 1 \\ &= 1001010100101101_2 \end{aligned}$$

## 1.5 Aufgabe 5

(a)

$$\begin{array}{r} 10110_2 \cdot 111_2 \\ \hline 10110_2 \\ + \ 10110_2 \\ + \ 10110_2 \\ \hline 10011010_2 \end{array}$$

(b)

$$\begin{array}{r} 10010010_2 \cdot 1001001_2 \\ \hline 10010010_2 \\ + \ 0_2 \\ + \ 0_2 \\ + \ 10010010_2 \\ + \ 0_2 \\ + \ 0_2 \\ + \ 10010010_2 \\ \hline 10100110100010_2 \end{array}$$

(c)

$$\begin{array}{r} 10011110_2 \cdot 10101_2 \\ \hline 10011110_2 \\ + 0_2 \\ + 10011110_2 \\ + 0_2 \\ + 10011110_2 \\ \hline 110011110110_2 \end{array}$$