

Aufgabe 1

a)

i) $117_{10} = 01110101_2$
 $28_{10} = 00011100_2$

$$\begin{array}{r}
 0\ 1\ 1\ 1\ 0\ 1\ 0\ 1 \\
 +\ 0\ 0\ 0\ 1\ 1\ 1\ 0\ 0 \\
 \hline
 1\ 1\ 1\ 1 \\
 \hline
 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1
 \end{array}$$

$(117 + 28 = 145)$

ii) $35_{10} = 00100011_2$
 $163_{10} = 10100011_2$

$$\begin{array}{r}
 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \\
 +\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 1\ 0\ 1 \\
 \hline
 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1 \\
 \hline
 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0
 \end{array}$$

$(35 + (-163) = -128)$

iii) $14_{10} = 00001110_2$
 $19_{10} = 00010011_2$

$$\begin{array}{r}
 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0 \\
 0\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ x \\
 \hline
 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0 \\
 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0 \\
 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \\
 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \\
 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0 \\
 \hline
 1\ 1\ 1\ 1\ 1 \\
 \hline
 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0
 \end{array}$$

$(14 \cdot 19 = 266)$

$$\begin{aligned} \text{iv) } 125_{10} &= 01111101_2 \\ 40_{10} &= 00101000_2 \end{aligned}$$

$$\begin{array}{r} 1\ 1\ 1\ 1\ 1\ 0\ 1 : 1\ 0\ 1\ 0\ 0\ 0 = 1\ 1 , 0\ 0\ 1 \\ - 1\ 0\ 1\ 0\ 0\ 0 \downarrow \\ \hline 1\ 0\ 1\ 1\ 0\ 1 \\ - 1\ 0\ 1\ 0\ 0\ 0 \downarrow \\ \hline 1\ 0\ 1\ 0 \\ - 0\ 0\ 0\ 0 \downarrow \\ \hline 1\ 0\ 1\ 0\ 0 \\ - 0\ 0\ 0\ 0\ 0 \downarrow \\ \hline 1\ 0\ 1\ 0\ 0\ 0 \\ 1\ 0\ 1\ 0\ 0\ 0 \\ \hline 0 \end{array}$$

$$(125 : 40 = 3,125)$$

- (b) i) 16-Bit-Ganzzahl
- ii) 8-Bit-Ganzzahl
- iii) 16-Bit-Ganzzahl
- iv) Fließkommazahl

Aufgabe 2

a)

Kleinste positive Zahl:

VZ = 0

Exponent = -126, mit Excess: $(-126 + 127)_{10} = 1_{10} = 00000001_2$

Mantisse = $1,000000000000000000000000_2$

VZ	Exponent	Mantisse
0	0 0 0 0 0 0 0 1	0 0

In wiss. Notation: $1 \cdot 2^{-126} \approx 1,17549 \cdot 10^{-38}$

Größte positive Zahl:

VZ = 0

Exponent = 127, mit Excess: $(127 + 127)_{10} = 254_{10} = 11111110_2$

Mantisse = $1,111111111111111111111111_2$

VZ	Exponent	Mantisse
0	1 1 1 1 1 1 1 0	1 1

In wiss. Notation:

$1,111111111111111111111111_2 \cdot 2^{127} \approx 2 \cdot 2^{127} \approx 3,40282 \cdot 10^{38}$

b)

Kleinste negative Zahl:

VZ = 1

Exponent = 127, mit Excess: $(127 + 127)_{10} = 254_{10} = 11111110_2$

Mantisse = $1,111111111111111111111111_2$

VZ	Exponent	Mantisse
1	1 1 1 1 1 1 1 0	1 1

In wiss. Notation:

$-1,111111111111111111111111_2 \cdot 2^{127} \approx -2 \cdot 2^{127} \approx -3,40282 \cdot 10^{38}$

Aufgabe 3

