

1.

$$a) \quad 1010 \quad 1010 \quad 1010 \quad 1010$$

$$b) \quad \begin{array}{cc} \text{5} & \text{C} \\ \underbrace{} & \underbrace{} \\ 0101 & 1010 = 5C \end{array}$$

$$c) \quad 0 \times FF = 1111 \quad 1111$$

$$d) \quad 0 \times 01 = 0000 \quad 0001$$

$$e) \quad 0 \times 11 = 0001 \quad 0001$$

$$2. \quad t = 5 \text{ ns} \quad \text{CPU: } 1 \text{ ns/ord} + 5 \text{ ns/fetch}$$

$$\Rightarrow 32 \text{ bits} / 6 \text{ ns} = 5.3 \text{ bits/ns}$$

$$160 \text{ MB/s} = 160 \cdot 8 \cdot 10^6 \text{ bits/s} = 160 \cdot 8 \cdot 10^3 \text{ bits/ns} \approx 1.3 \text{ bits/ns}$$

$$5.3 \text{ bits/ns} - 1.3 \text{ bits/ns} = \underline{4 \text{ bits/ns}}$$

3. 3 bytes / piksel per RGB-farge

3000 · 2000 piksler

$$\Rightarrow 3 \cdot 3000 \cdot 2000 = 18\,000\,000 \text{ bytes}$$

$$\frac{18\,000\,000}{5} = 3\,600\,000 \text{ bytes}$$

$$\frac{3\,600\,000}{0.5} = 7\,200\,000 \text{ bytes/s} = \underline{7.2 \text{ MB/s}}$$

4. Antar: 12 byte på å lagre når en melding er sendt
for mld < 500 bokstaver.

1 byte per bokstav.

(sender ingen mld > 500 bokst.)

$$= 512 \text{ bytes / mld.}$$

$$\frac{500 \text{ GB}}{512 \text{ bytes/mld}} = \underline{976\,562\,500 \text{ mld.}}$$

5. 9600 baud/s.

1 start bit.

1 byte data.

1 parity bit (odd-parity)

2 stop-bits

= 12 bits/frame.

$$\text{Total bits} = 9600 \text{ baud/s} \cdot 30 \text{ s} = 288000 \text{ bits}$$

$$\text{Total bytes} = \frac{288000 \text{ bits}}{12 \text{ bits/frame}} \cdot 8 = \underline{192000}$$

6.

bröker mod på kalk

a)

$$16348 = 1021 \times 16 + 12$$

$$1021 = 63 \times 16 + 13$$

$$63 = 3 \times 16 + 15$$

$$3 = 0 \times 16 + 3$$

$$16348_{16} = \underline{3FDC}$$

$$b) (2^{32} - 1)_{16}$$

$$(2^{32} - 1) \bmod 16 = 15 = F_{16}$$

$$\vdots$$

$$(2^4 - 1) \bmod 16 = 15 = F_{16}$$

$$\times 6 = \underline{\text{FFFFFFFF}}$$

7.

$$a) n = \lceil \log_2(x+1) \rceil = \lceil \log_2(4242424243) \rceil = \underline{32 \text{ bits}}$$

$$b) \underline{2^{24} - 1 = 16777215}$$

8.

1 2 3

1. Ta mod 2 heißt til 0: (Euclidean)

$$123 = 61 \times 2 + \underline{1}$$

$$61 = 30 \times 2 + \underline{1}$$

$$30 = 15 \times 2 + \underline{0}$$

$$15 = 7 \times 2 + \underline{1}$$

$$7 = 3 \times 2 + \underline{1}$$

$$3 = 1 \times 2 + \underline{1}$$

$$1 = \underline{0} \times 2 + \underline{1}$$

$$0 = 0 \times 2 + \underline{0}$$

$$\underline{-123_2 = 1\ 0111011}$$

2. Zweikomplement:

$$-123_2 = 10000100$$

geggt. til en

$$\underline{= 10000101}$$