**Ziele :** **Binary**, **octal**, **and** **hexadecimal** **number systems**

**Details**

**Aufgabe 1: Binary to Decimal Conversion**

* **Objective**: Convert binary numbers into decimal.
* **Instructions**:
  + Convert the following binary numbers to their decimal equivalents:
    1. 1010
    2. 1101
    3. 100011
    4. 111000
    5. 10110101
  + **Bonus**: Explain how each conversion is done by breaking down the binary number into powers of 2.

**Aufgabe 2: Decimal to Binary Conversion**

* **Objective**: Convert decimal numbers into binary.
* **Instructions**:
  + Convert the following decimal numbers to their binary equivalents:
    1. 18
    2. 25
    3. 63
    4. 128
    5. 255
  + **Bonus**: Explain how each conversion is done using the division by 2 method.

**Aufgabe 3: Binary Addition**

* **Objective**: Practice binary addition.
* **Instructions**:
  + Add the following binary numbers and provide the results in binary:
    1. 1010 + 1100
    2. 111 + 101
    3. 1001 + 1110
    4. 10101 + 11011
    5. 100110 + 101011
  + **Bonus**: Convert the results to decimal to verify the calculations.

**Aufgabe 4: Octal to Decimal Conversion**

* **Objective**: Convert octal numbers into decimal.
* **Instructions**:
  + Convert the following octal numbers to their decimal equivalents:
    1. 12 (octal)
    2. 34 (octal)
    3. 77 (octal)
    4. 145 (octal)
    5. 321 (octal)
  + **Bonus**: Explain how each conversion is done by breaking down the octal number into powers of 8.

**Task 5: Hexadecimal to Decimal Conversion**

* **Objective** :Convert Hexadecimal numbers into Decimal
* **Instructions** : Convert the following hexadecimal numbers to their decimal equivalents:
  1. A7 (base 16)
  2. 4F
  3. 1C
  4. 2B9
  5. F2A

**Bonus**: Explain how hexadecimal digits are converted using powers of 16.

**Aufgabe 6: Hexadecimal to Decimal Conversion**

* **Objective**: Convert hexadecimal numbers into decimal.
* **Instructions**:
  + Convert the following hexadecimal numbers to their decimal equivalents:
    1. A3 (hex)
    2. 1F (hex)
    3. B7 (hex)
    4. 2D (hex)
    5. FF (hex)
  + **Bonus**: Break down the steps for each conversion by explaining how each digit in the hexadecimal system is interpreted as a power of 16.

**Aufgabe 7: Decimal to Hexadecimal Conversion**

* **Objective**: Convert decimal numbers into hexadecimal.
* **Instructions**:
  + Convert the following decimal numbers to their hexadecimal equivalents:
    1. 45
    2. 255
    3. 4096
    4. 1024
    5. 65535
  + **Bonus**: Show how the division by 16 method is used for each conversion.

**Task 8: Hexadecimal to Binary Conversion**

* **Objective**: Convert **Hexadecimal number to Binary**
* **Instructions**: Convert the following hexadecimal numbers to their binary equivalents.
  1. A1
  2. 3F
  3. 4B7
  4. 7D
  5. BCD
* **Bonus**: Explain how each hexadecimal digit corresponds to a group of four binary digits.

**Aufgabe 9: Binary, Octal, and Hexadecimal Conversion**

* **Objective**: Convert numbers between binary, octal, and hexadecimal.
* **Instructions**:
  + Convert the following binary numbers to octal and hexadecimal:
    1. 10101101
    2. 1101011
    3. 10011001
    4. 11100011
    5. 100101010
  + **Bonus**: Explain the relationship between binary, octal, and hexadecimal conversions and how grouping binary digits helps in these conversions (3 bits = 1 octal digit, 4 bits = 1 hexadecimal digit).

**Task 10: Binary Multiplication**

* **Objective**: Practice binary multiplication.
* **Instructions**:
  + Multiply the following binary numbers:
    1. 101 × 11
    2. 110 × 101
    3. 1001 × 10
    4. 111 × 100
    5. 1011 × 11
  + **Bonus**: Convert the results to decimal and verify the calculations.

**Begrenzungen**

• Bei Fragen wendet euch gerne bei den Ausbildern

• Das Wichtigste: benutzen Sie nicht chatGPT

• Referenz-Websites, auf denen Sie mehr über Zahlensysteme lernen können, einschließlich binärer, oktaler, dezimaler und hexadezimaler Systeme

* [Types of Number Systems: Decimal, Binary, Octal & Hexadecimal (geeksforgeeks.org)](https://www.geeksforgeeks.org/how-many-types-of-number-systems-are-there/)
* [Number Systems - Definition | Types of Number Systems in Maths | Conversion (cuemath.com)](https://www.cuemath.com/numbers/number-systems/)
* [Hexadezimalzahlen - Matheretter](https://www.matheretter.de/wiki/hexadezimalzahlen)

**Info**:

Bitte postet euere Ergebnisse jeweils in meinem persönlichen Chat Und Mani Malekpour persönlichen Chat.

**Zeitvorgaben**

Fertigstellung bis Freitag, 27.09.2024 EOD (10:00)