### **Assignment: Binary Number Division**

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#### **Objective:**

To understand and perform binary number division through a step-by-step example.

### **Introduction to Binary Division**

Binary division is similar to decimal division but uses only two digits: 0 and 1. The process involves dividing a binary number (the dividend) by another binary number (the divisor) to find the quotient and the remainder.

### **Steps for Binary Division**

1. **Write the Dividend and Divisor**: Identify the binary numbers you want to divide.
2. **Align the Numbers**: Write the dividend and divisor in a long division format.
3. **Perform the Division**:
   1. Compare the divisor with the leftmost bits of the dividend.
   2. If the divisor fits, subtract it from the dividend, write a 1 in the quotient, and bring down the next bit.
   3. If it does not fit, write a 0 in the quotient and bring down the next bit.
4. **Repeat**: Continue the process until all bits of the dividend have been brought down.
5. **Final Result**: The quotient is the result of the division, and any remaining value is the remainder.

### **Example: Divide 101101 (45 in decimal) by 11 (3 in decimal)**

#### **Step 1: Write the Dividend and Divisor**

* Dividend: 101101
* Divisor: 11

#### **Step 2: Align the Numbers**

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1 \_\_\_\_  
211 | 101101

#### **Step 3: Perform the Division**

1. **Compare the divisor (11) with the first two bits of the dividend (10)**:
   1. 11 does not fit into 10, so write 0 in the quotient.
   2. Bring down the next bit (1).

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1 0  
2 \_\_\_\_  
311 | 101101  
4 00

1. **Now compare 11 with 101**:
   1. 11 fits into 101 (1 time).
   2. Write 1 in the quotient.
   3. Subtract 11 from 101 (which is 3 in decimal).

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1 01  
2 \_\_\_\_  
311 | 101101  
4 11  
5 ----  
6 010

1. **Bring down the next bit (1)**, making it 010:
   1. 11 does not fit into 010, so write 0 in the quotient.

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1 010  
2 \_\_\_\_  
311 | 101101  
4 11  
5 ----  
6 0101

1. **Now compare 11 with 101**:
   1. 11 fits into 101 (1 time).
   2. Write 1 in the quotient.
   3. Subtract 11 from 101.

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1 0101  
2 \_\_\_\_  
311 | 101101  
4 11  
5 ----  
6 0100

1. **Bring down the last bit (0)**, making it 0100:
   1. 11 does not fit into 0100, so write 0 in the quotient.

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1 01010  
2 \_\_\_\_  
311 | 101101  
4 11  
5 ----  
6 01000

1. **Now compare 11 with 100**:
   1. 11 fits into 100 (1 time).
   2. Write 1 in the quotient.
   3. Subtract 11 from 100.

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1 01010  
2 \_\_\_\_  
311 | 101101  
4 11  
5 ----  
6 0011

1. **Final Result**:
   1. Quotient: 01010 (which is 10 in decimal)
   2. Remainder: 0011 (which is 3 in decimal)

### **Conclusion**

In this example, dividing the binary number 101101 by 11 gives a quotient of 01010 and a remainder of 0011. This assignment illustrates the process of binary division clearly.