# Template Week 1 – Bits & Bytes

Student number:

**Assignment 1.1: Bits & Bytes intro**

What are Bits & Bytes?

Bits: its smallest form of information a computer can process, and it has only 2 possible values 1 and 0

- A byte is a group of 8bits

What is a nibble?

A nibble is a digit or a unit that consists of  4bits

What relationship does a nibble have with a hexadecimal value?

The relationship which a nibble has with a hexadecimal value is a nibble (1nibble) is equal to one hexadecimal digit (1nibble = 1hexadecimal digit)

Why is it wise to display binary data as hexadecimal values?

It's wise to display binary information as hexadecimal values because hexadecimal is easier to read and understand than binary and its shorter and less repetitive than binary and all this simply reduces the likelihood of errors when working with large numbers

What kind of relationship does a byte have with a hexadecimal value?

The relationship which a byte has with a hexadecimal value is; a byte which is 8 bits can be divided into 2, 4-bit chunks(nibbles), and each nibble corresponds to exactly one hexadecimal digit

An IPv4 subnet is 32-bit, show with a calculation why this is the case.

A subnet mask specifies how the 32 bits of an IPv4 address are divided between the network part and the host part like an IPV4 address, a subnet mask is also a 32-bit binary number as well

e.g.

1. subnet mask: 255.0.0.0

255 in binary = 11111111

0 in binary = 00000000

- Binary: 11111111.00000000.00000000.00000000

- Total bits: 8+0+0+0=328+0+0+0=32.

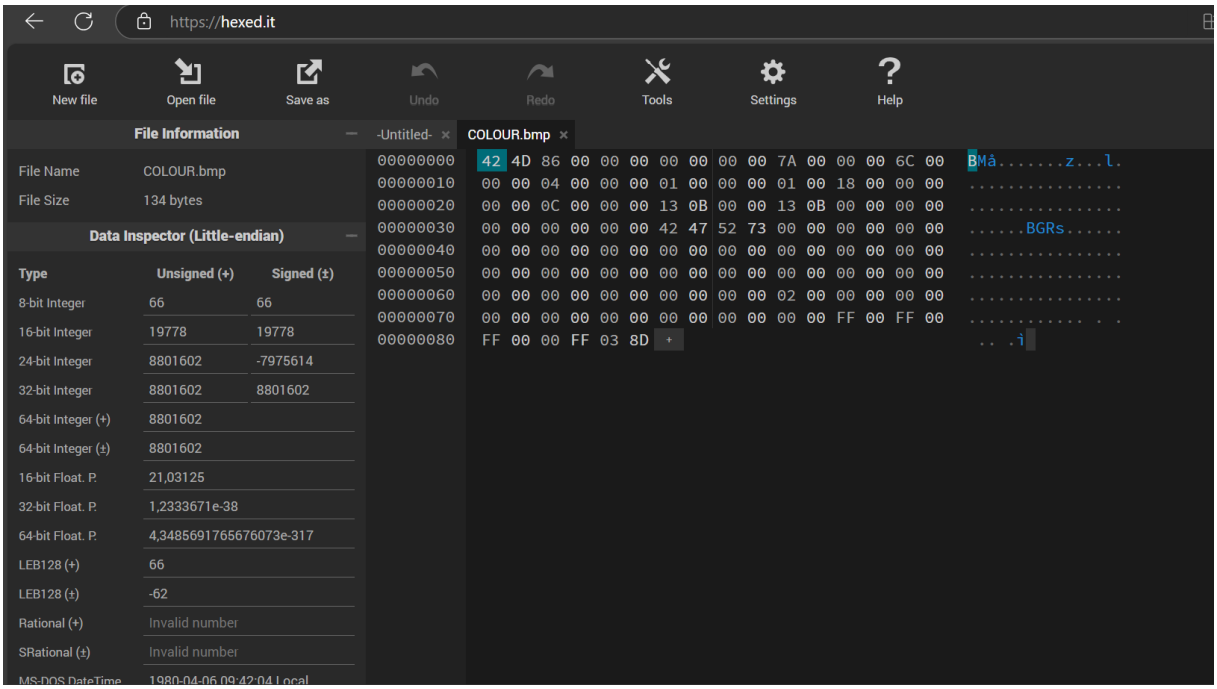
**Assignment 1.2: Your favourite colour**

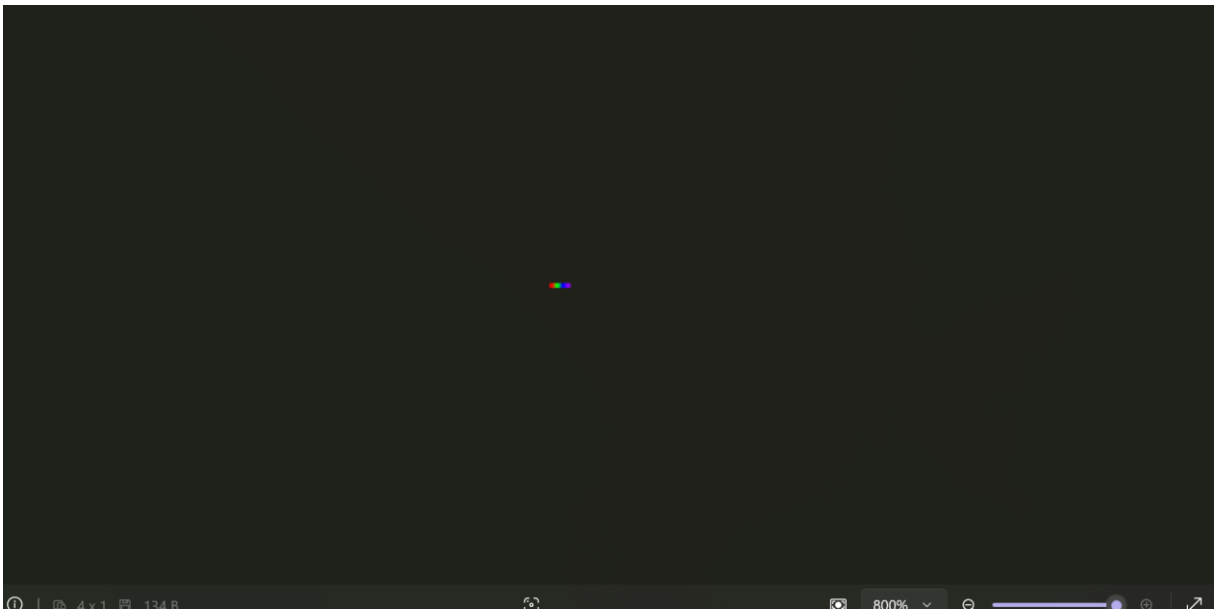
Hexadecimal colour code: #ff038d

**Assignment 1.3: Manipulating binary data**

| Colour | Colour code hexadecimaal (RGB) | Big Endian | Little Endian |
|---|---|---|---|
| RED | #FF0000 | FF 00 00 | 00 00 FF |
| GREEN | #00FF00 | 00 FF 00 | 00 FF 00 |
| BLUE | #0000FF | 00 00 FF | FF 00 00 |
| WHITE | #FFFFFF | FFFFFF | FF FF FF |
| **Favourite** (previous assignment) | #ff038d | FF 03 8D | 8D 03 FF |

**Screenshot modified BMP file in hex editor:**




4 x 1
134 B
800%

**Bonus point assignment – week 1**

Convert your student number to a hexadecimal number and a binary number.

Explain in detail that the calculation is correct. Use the PowerPoint slides of week 1.

My student number is 564604

| Division by 2 | Quotient | Remainder |
|---|---|---|
| 564604 ÷ 2 | 282302 | 0 |
| 282302 ÷ 2 | 141151 | 0 |
| 141151 ÷ 2 | 70575 | 1 |
| 70575 ÷ 2 | 35287 | 1 |
| 35287 ÷ 2 | 17643 | 1 |
| 17643 ÷ 2 | 8821 | 1 |
| 8821 ÷ 2 | 4410 | 1 |
| 4410 ÷ 2 | 2205 | 0 |
| 2205 ÷ 2 | 1102 | 1 |
| 1102 ÷ 2 | 551 | 0 |
| 551 ÷ 2 | 275 | 1 |
| 275 ÷ 2 | 137 | 1 |
| 137 ÷ 2 | 68 | 1 |
| 68 ÷ 2 | 34 | 0 |
| 34 ÷ 2 | 17 | 0 |
| 17 ÷ 2 | 8 | 1 |
| 8 ÷ 2 | 4 | 0 |
| 4 ÷ 2 | 2 | 0 |
| 2 ÷ 2 | 1 | 0 |
| 1 ÷ 2 | 0 | 1 |

1) To convert to binary, we divide the given number by 2 and record the remainder of the quotient as seen in the table above
2) We then read the remainders from bottom to top
3) If we read the remainders from bottom to top as in the table above? we get 10001001110101111100

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