Tutorial 3: Number Systems

Problem 1: Data Representation

Consider the number A = 0xF2. What is the value of this number when represented in; 8-bit unsigned number, 8-bit sign-magnitude, 8-bit one's complement, and 8-bit two's complement?

Problem 2: Data Types

Consider the C code in Figure 1. Answer the following questions.

What are the outputs of the `printf` statements?

What are the outputs of the `printf` statements if (`a = 0xFFFFFFE5`) and (`b = 0xFFFFFFE5`)?

```
#include <stdio.h>

int main (void)
{
    int a = 0xE5;
    char b = 0xE5;

    printf("integer = \"%d\"\n\n", a);
    printf("char = \"%d\"\n\n", b);

    return 0;
}
```

Figure 1: Program on Data Type Conversion

Problem 3: More Data Type Conversion

Consider the C code in Figure 4. Answer the following questions.

Which of the print statements will be printed out?

```
#include <stdio.h>

int main (void)
{
    unsigned int a =0xFFFFFFFB;
    int b =0xFFFFFFFB;
    char c = 0xFD;

    if (a < (unsigned) c)
        {printf("a < c \n\n");}
    if (b < (int) c)
        {printf("b < c \n\n");}

    return 0;
}
```

Figure 4: Program on Data Type Conversion

Problem 4: Binary Prefixes

How much is 2^{27} Byes?

We need to access a memory organisation as large as 2.4 Mi Bytes. How many address lines are required for this purpose?