Lab 3 - Functions

1. Write a C Program to find factorial of a number using recursion
    - The factorial of a positive number n is given by:
      `factorial of n (n!) = 1 * 2 * 3 * 4....n`
      sample output:

```
Enter a positive integer: 6
Factorial of 6 = 720
```

2. Write a C program to calculate the power of a number using recursion sample output:

```
Enter base number: 3
Enter power number(positive integer): 4
3^4 = 81
```

3. Write a C Program to convert binary number to decimal
    - $A = x_n * b^n + x_{n-1} * b^{n-1} + ... + x_1 * b^1 + x_0 * b^0$
      Where,
        - A represents the integer
        - x represents the digit value
        - b represents the base value

    Example:

    $(1000)_2 = 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$

    - binary number is represented as a string of characters i.e. `"1101"`
      sample output:

```
Enter a binary number: 1101
1101 in binary = 13 in decimal
```

4. Write a C Program to convert decimal number to binary **Example:** Convert the decimal number 13_{10} to binary.
    - Divide the number 13 repeatedly by 2 untill you get '0' as the quotent
      13 ÷ 2 = 6 (remainder 1) → 1
      6 ÷ 2 = 3 (remainder 0) → 01
      3 ÷ 2 = 1 (remainder 1) → 101
      1 ÷ 2 = 0 (remainder 1) → 1101

- binary number is represented as a string of characters i.e. `"1101"`
  sample output:

```
Enter a decimal number: 13
13 in decimal = 1101 in binary
```

Optional Exercises

5. Write a C Program to convert decimal number to hexadecimal

Conversion Table

HEXADECIMAL	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
DECIMAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

- Divide the decimal number by 16. Treat the division as an integer division.
- Write down the remainder (in hexadecimal).
- Divide the result again by 16. Treat the division as an integer division.
- Repeat step 2 and 3 until result is 0.
- The hex value is the digit sequence of the remainders from the last to first.

Example: Convert the number 256 decimal to hexadecimal
590 ÷ 16 = 36 → (remainder E(14 decimal))
36 ÷ 16 = 2 → (remainder 4 (4 decimal))
2 ÷ 16 = 0 → (remainder 2 (2 decimal))
Answer = 24E

- hexadecimal number is represented as a string of characters i.e. `"C1"`
  sample output:

```
Enter a decimal number: 193
193 in decimal = C1 in hexadecimal
```

6. Write a C Program to convert hexadecimal number to decimal

Conversion Table

DECIMAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HEXADECIMAL	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

- Decimal Number = $d_{n-1} \times 16^{r-1} + ... + d_2 \times 16^2 + d_1 \times 16^1 + d_0 \times 16^0$.
  Where,
  - n = the number of digits.
  - r = placement of the digit (from the right side starting from r = 0)

Example:

$(25)_{16} = 2 \times 16^1 + 5 \times 16^0$

$= 2 \times 16 + 5 \times 1$

$= 32 + 5$

$= 37$

Therefore, $(25)_{16} = (37)_{10}$.

- hexadecimal number is represented as a string of characters i.e. `"C1"` sample output:

```
Enter an hexadecimal number: C1
C1 in hexadecimal = 193 in decimal
```