

# Problems based on Recursion – 5

## Assignment Solutions



**Q1 – Given two numbers x and y find a product using recursion.**

(Easy)

**Input :** x = 5, y = 2

**Expected Output :** 10

**Explanation:**

- If x is less than y, swap the two variables value
- Recursively find y times the sum of x
- If any of them become zero, return 0

**Code:**

<https://pastebin.com/DVkJtS4h>

**Output Snippet:**

```
Enter the numbers : 5 2
The product is : 10

...Program finished with exit code 0
Press ENTER to exit console.□
```

**Q2 – Given a number n, check whether it's a prime number or not using recursion.**

(Easy)

**Input :** n = 11

**Output :** Yes

**Explanation:**

- We use the general algorithm to check if a number is prime.
- A number is prime if it cannot be divided entirely (with remainder 0) by any number other than 1 and itself.
- This can be shortened by dividing the number from 1 till i where  $i*i \leq n$ .
- We call a recursive function with n and i as parameters, i representing the divisor and initialized with 2.
- If at any point,  $n\%i$  becomes 0, we return false as the number is not prime.
- We stop when  $i*i$  exceeds n.

**Code:**

<https://pastebin.com/fbFyCsBe>

**Output Snippet:**

```
Enter the number : 11
Yes

...Program finished with exit code 0
Press ENTER to exit console.□
```

Q3 – Given a decimal number as input, we need to write a program to convert the given decimal number into its equivalent binary number.

(Easy)

**Input :** 7

**Expected Output :** 111

**Explanation:**

- 2 | 7 | 1 ↑
- 2 | 3 | 1 |
- 2 | 1 | 1 |
- Arrange the remainders in reverse fashion, so binary number becomes 111.
- Recursively we perform the first step, and call recursion for all others.

Another example:

- 2 | 6 | 0 ↑
- 2 | 3 | 1 |
- 2 | 1 | 1 |
- Arrange the remainders in reverse fashion, so binary number becomes 110
- Recursively we perform the first step, and call recursion for all others

**Code:**

<https://pastebin.com/gTeZEd1c>

**Output Snippet:**

```
Enter the number : 7
111

...Program finished with exit code 0
Press ENTER to exit console. □
```

**Q4 -** Given the Binary code of a number as a decimal number, we need to convert this into its equivalent Gray Code. In gray code, only one bit is changed in 2 consecutive numbers.

(Medium)

**Input:** 1001

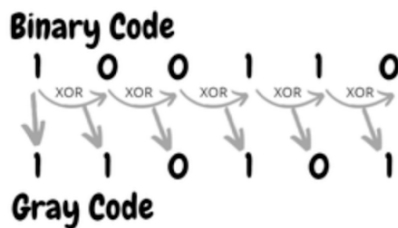
**Expected Output:** 1101

**Explanation:**

- Binary to Gray conversion :

The Most Significant Bit (MSB) (the first digit) of the gray code is always equal to the MSB of the given binary code.

Other bits of the output gray code can be obtained by XORing binary code bit at that index and previous index.



- In recursive function, we check whether the last bit and second last bit are same or not, if it is same then move ahead otherwise add 1 as for XOR, if two bits are different, only then the output is true or 1.

**Code:**

<https://pastebin.com/hzcicpEq>

**Output Snippet:**

```
Enter the binary number : 1001
1101

...Program finished with exit code 0
Press ENTER to exit console. □
```