# Week 2 – Logic

Student number:

570215

**Assignment 2.1: Parking lot**

Which gates do you need?

Two AND gates

Complete this table

| Parking lot 1 | Parking lot 2 | Parking lot 3 | Result (full) |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 |

**Assignment 2.2: Android/iPhone**

Which gates do you need?

XOR gate

Complete this table

| Android phone | iPhone | Result (Phone in possession) |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

**Assignment 2.3: Four NAND gates**

Complete this table

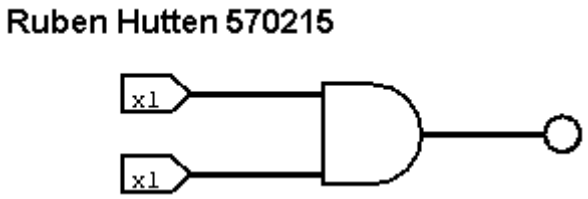
| A | B | Q |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

How can the design be simplified?

This design could be simplified by removing the bottom and right NAND gates. Connecting B to only the centre NAND gate

**Assignment 2.4: Getting to know Logisim evolution**

Screenshot of the design with your name and student number in it:




**Bonus point assignment – week 2**

Create a java program that accepts user input and presents a menu with options.

1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

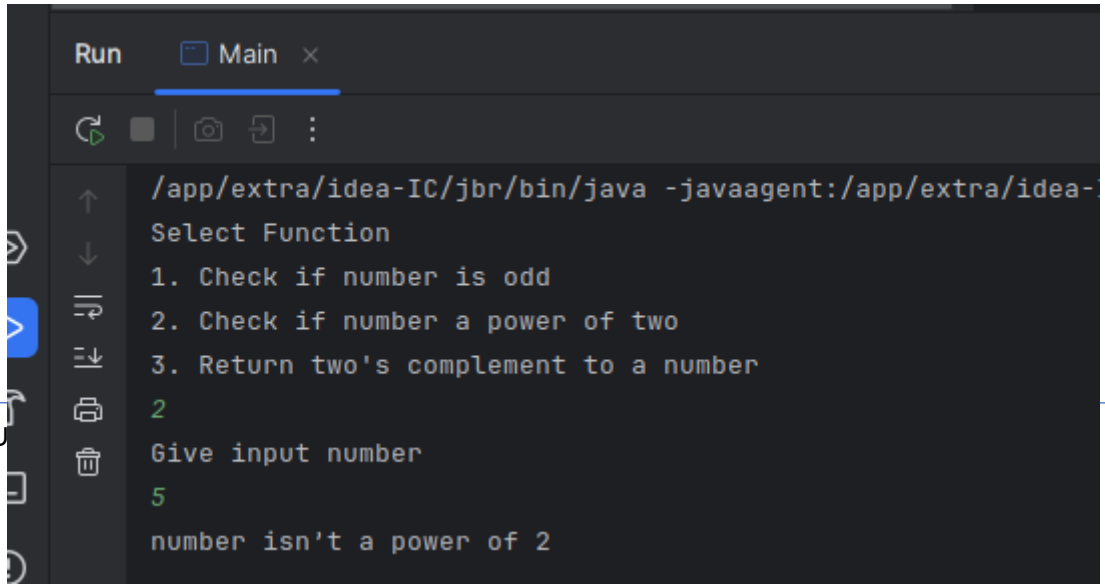
Implement the methods by using the bitwise operators you have just learned.

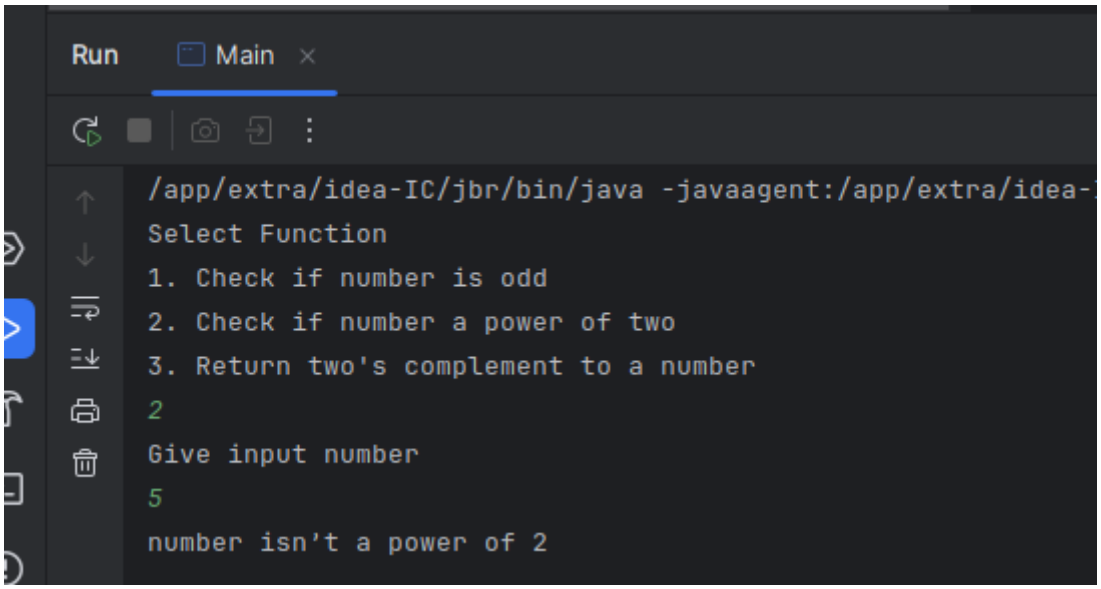
Organize your source code in a readable manner with the use of control flow and methods.

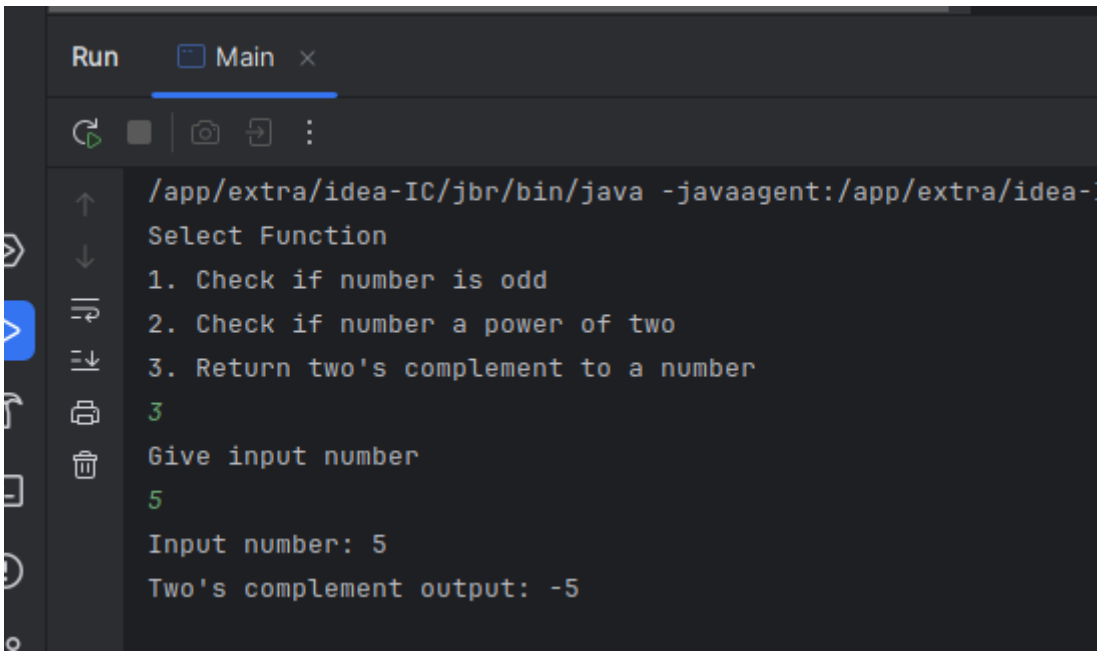
Paste source code here, with a screenshot of a working application.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        System.out.println("Select Function");
        System.out.println("1. Check if number is odd");
        System.out.println("2. Check if number a power of two");
        System.out.println("3. Return two's complement to a number");

        Scanner scanner = new Scanner(System.in);
```

```
        int response = scanner.nextInt();
        switch (response) {
            case 1:
                checkIfNumberIsOdd(scanner);
                break;
            case 2:
                checkIfNumberIsPowerOfTwo(scanner);
                break;
            case 3:
                printTwosCompliment(scanner);
                break;
            default:
                System.out.println("Invalid Input. Try again");
                main(args);
        }
    }

    public static void checkIfNumberIsOdd(Scanner scanner)
    {
        System.out.println("Give input number");
        int number = scanner.nextInt();
        if ((number & 1) == 1) System.out.println("number is odd");
        else System.out.println("number is even");
    }

    public static void checkIfNumberIsPowerOfTwo(Scanner scanner)
    {
        System.out.println("Give input number");
        int number = scanner.nextInt();
        if ((number & (number - 1)) == 0) System.out.println("number is a power of 2");
        else System.out.println("number isn't a power of 2");
    }

    public static void printTwosCompliment(Scanner scanner)
    {
        System.out.println("Give input number");
        int number = scanner.nextInt();
        int twosComplementOutput = (~number) + 1;
        System.out.println("Input number: " + number);
        System.out.println("Two's complement output: " + twosComplementOutput);
    }

}
```



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