

# Template Week 2 – Logic

Student number: 579185 -Nafsiqa Pagkali

## Assignment 2.1: Parking lot

Which gates do you need?

We will use AND gate

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
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

## Assignment 2.2: Android or 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	1

### **Assignment 2.3: Four NAND gates**

Complete this table

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

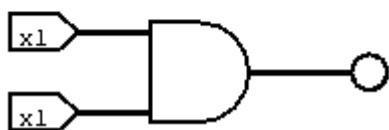
How can the design be simplified?

It can also be done with one NAND gate

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

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

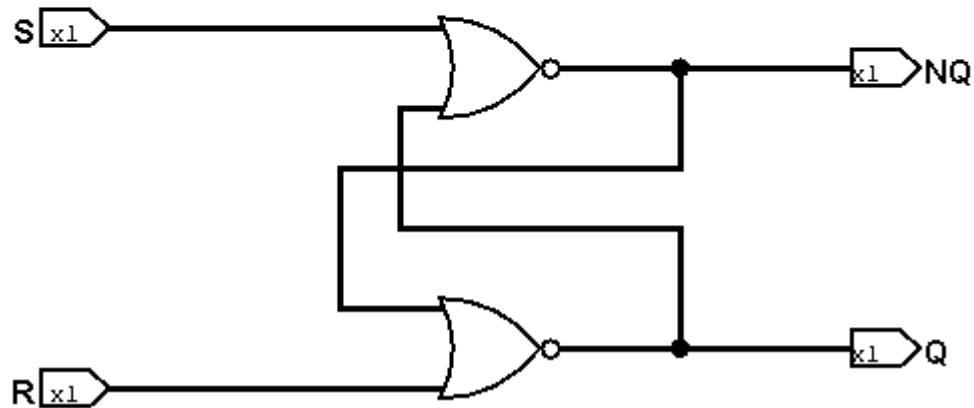
**Nafsika Pagkali**



### **Assignment 2.5: SR Latch**

Screenshot SR Latch in Logisim with your name and student number:

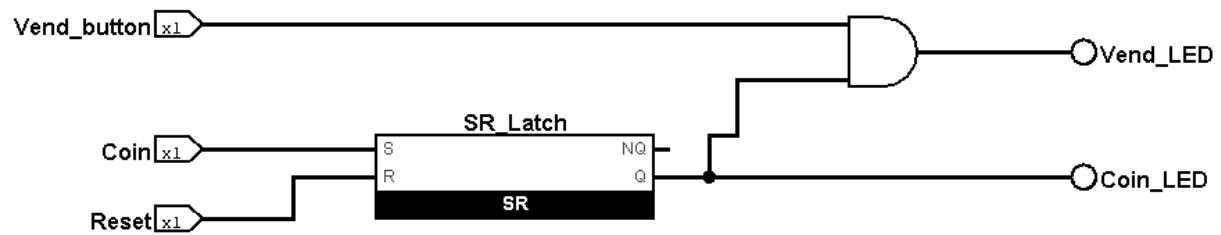
nafsika Pagkali 579185



#### Assignment 2.6: Vending Machine

Screenshot Vending Machine in Logisim with your name and student number:

Nafsika pagkali 579185



### **Assignment 2.7: Bitwise operators**

Complete the java source code for bitwise operators. Put the source code here.

### **Assignment 2.8: Java Application Bit Calculations**

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.

Keep this application because you need to expand it in week 6 for calculating network segments.

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

```
public static void main(String[] args) {

    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a number: ");
    int number = scanner.nextInt();

    int choice = 0;

    while (choice != 4) {
        System.out.println("\n===== BITWISE OPERATIONS MENU =====");
        System.out.println("1. Is number odd?");
        System.out.println("2. Is number a power of 2?");
        System.out.println("3. Two's complement of number");
        System.out.println("4. Exit");
    }
}
```

```

System.out.print("Enter your choice: ");

choice = scanner.nextInt();

switch (choice) {
    case 1:
        if (isOdd(number)) {
            System.out.println(number + " is odd.");
        } else {
            System.out.println(number + " is even.");
        }
        break;

    case 2:
        if (isPowerOfTwo(number)) {
            System.out.println(number + " is a power of 2.");
        } else {
            System.out.println(number + " is NOT a power of 2.");
        }
        break;

    case 3:
        System.out.println("Two's complement of " + number + " is: " +
twoesComplement(number));
        break;

    case 4:
        System.out.println("Exiting program...");
        break;

    default:
        System.out.println("Invalid option. Try again.");
}
}

scanner.close();
}

// METHODS

// Check if number is odd with AND
public static boolean isOdd(int num) {
    return (num & 1) == 1;
}

// Check if number is power of 2
public static boolean isPowerOfTwo(int num) {
    // Must be positive and only one bit set: n & (n-1) == 0
}

```

```

        return num > 0 && (num & (num - 1)) == 0;
    }

// Compute two's complement using bitwise NOT + 1
public static int twosComplement(int num) {
    return (~num) + 1;
}
}

```

The screenshot shows a Java IDE interface with the following details:

- File Explorer:** Shows a folder icon and the file name `Bitwise.java`.
- Code Editor:** Displays the `Bitwise.java` code. Lines 35 and 36 are highlighted in green, indicating they are part of a conditional block.
- Run Tab:** Shows the command to run the application: `C:\Users\utente\.jdks\ms-21.0.9\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\javassist-agent.jar" -Dfile.encoding=UTF-8 Bitwise`. The application has been run, and the output window shows the following:
- Output Window:**
  - Java command: `C:\Users\utente\.jdks\ms-21.0.9\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\javassist-agent.jar" -Dfile.encoding=UTF-8 Bitwise`
  - User input: `Enter a number: 2`
  - Application output:
    - ===== BITWISE OPERATIONS MENU =====
    - 1. Is number odd?
    - 2. Is number a power of 2?
    - 3. Two's complement of number
    - 4. Exit
  - User choice: `Enter your choice:`

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