# Template Week 2 – Logic

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**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 |

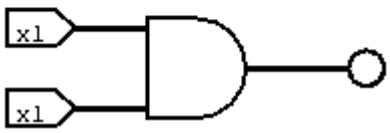
How can the design be simplified?

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:

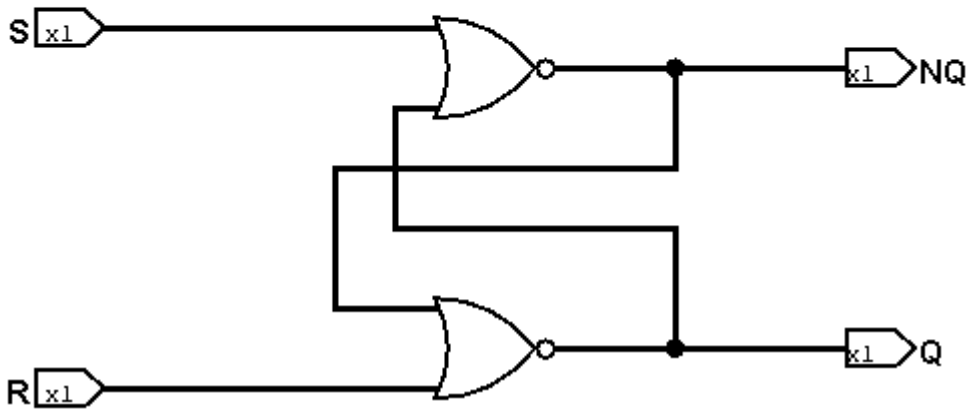
Nafsika Pagkali




**Assignment 2.5: SR Latch**

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

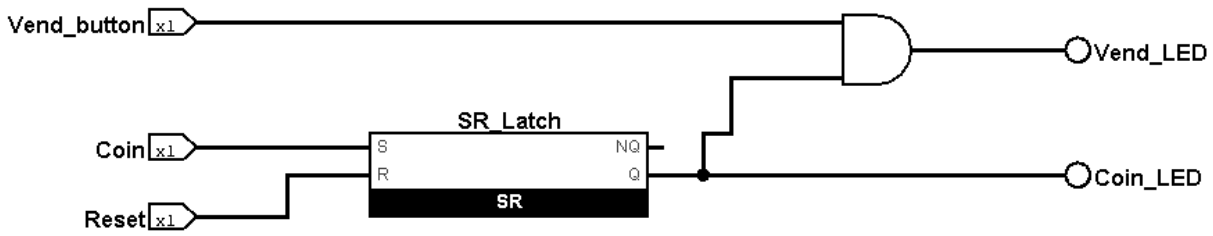
nafsika Pagkali 579185




**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.

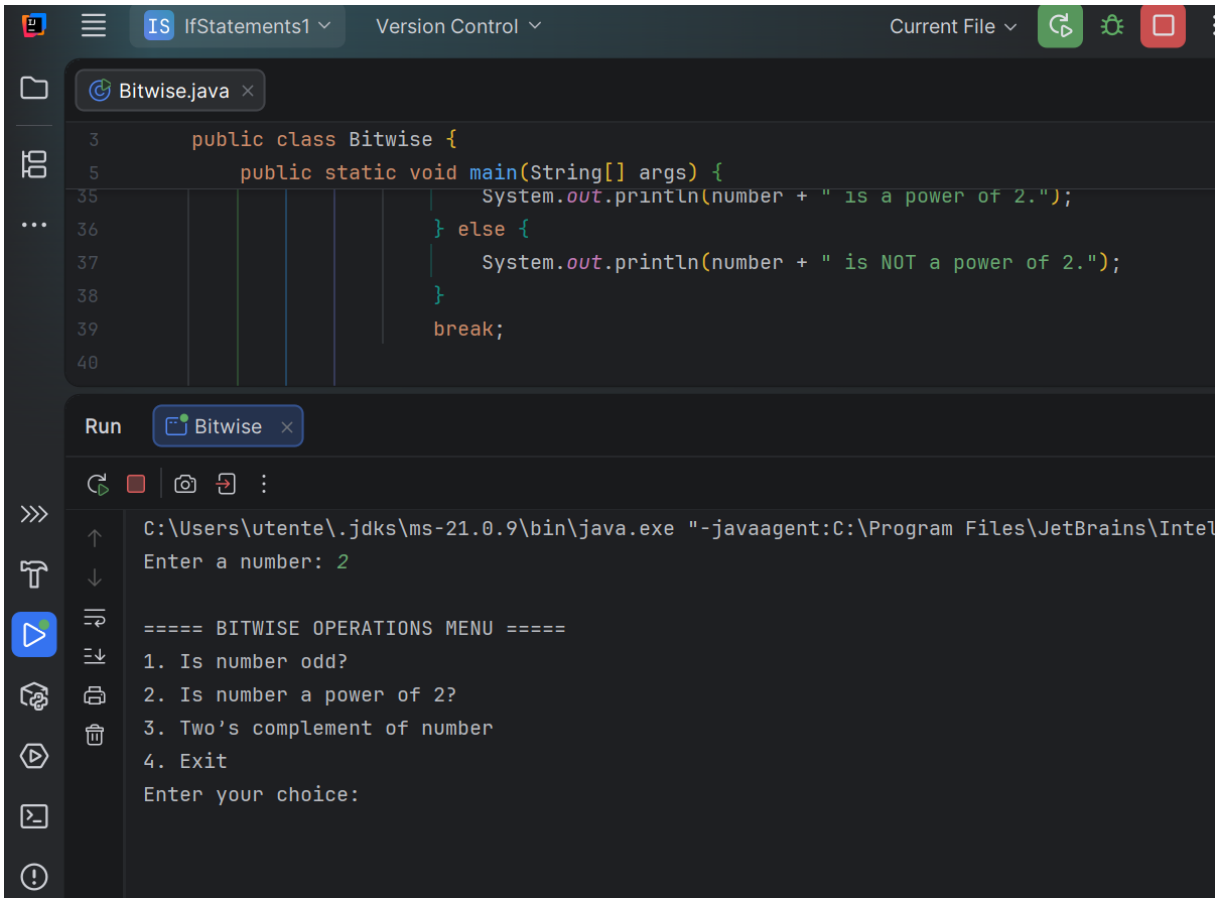
Keep this application because you need to expand it in week 6 for calculating network segments.

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: " +
twosComplement(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;
  }
}
```

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