# Template Week 2 – Logic

Student number:

**578848**

**Assignment 2.1: Parking lot**

Which gates do you need?

**Three-Input AND gate (Or two two-input 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 |

**Basically every row that has zero in it, would yield 0 and only row with all ones would yield 1.**

**Assignment 2.2: Android or iPhone**

Which gates do you need?

**I need one XOR gate.**

Complete this table

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

**Assignment 2.3: Four NAND gates**

Complete this table

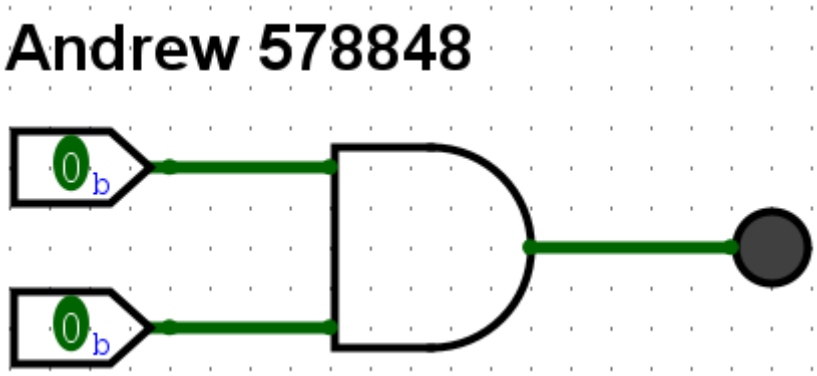
| A | B | Q |
|---|---|---|
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 1 | 0 |
| 0 | 0 | 1 |

How can the design be simplified?

**You could use AND gate for A and B and then NOT gate to get the same result.**

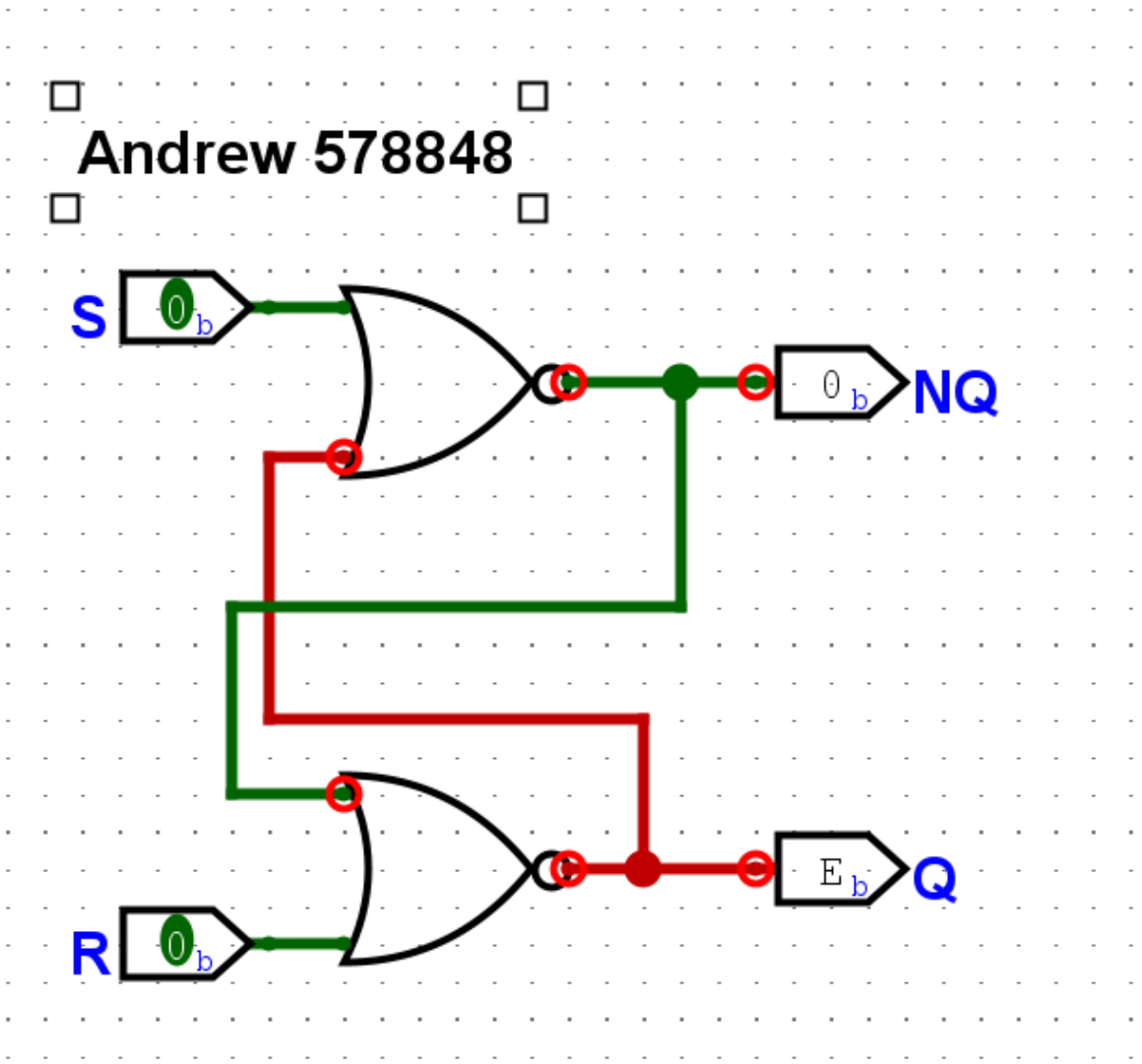
**Assignment 2.4: Getting to know Logisim evolution**

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



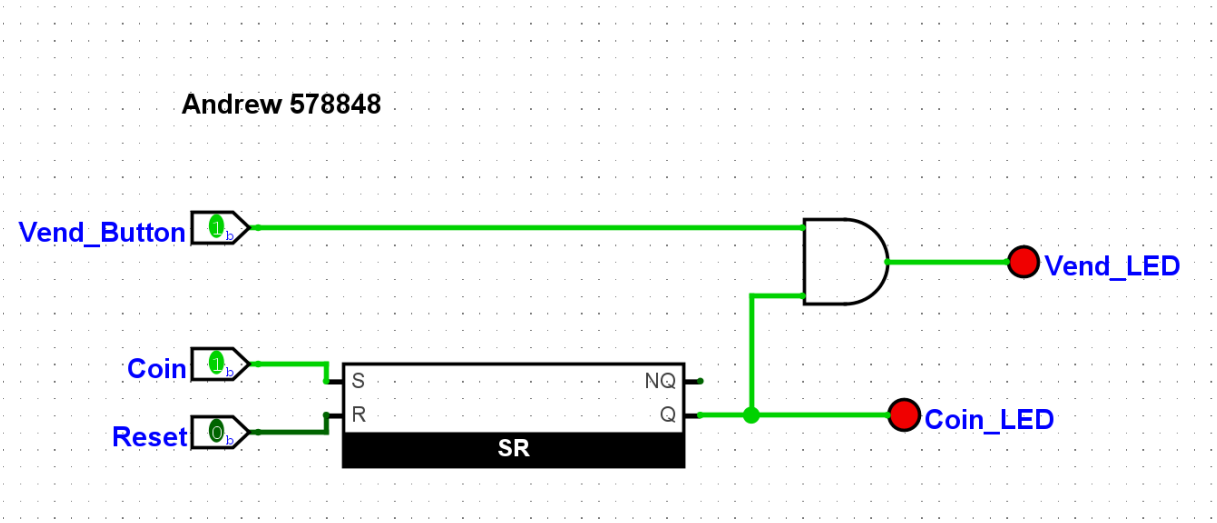

**Assignment 2.5: SR Latch**

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




**Assignment 2.6: Vending Machine**

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



**Assignment 2.7: Bitwise operators**

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

```
public class Main {
   static final int READ = 4;
   static final int WRITE = 2;
   static final int EXECUTE = 1;

   public static void main(String[] args) {
      oddOrEven(8);
      oddOrEven(7);

      isPowerOfTwo(2); isPowerOfTwo(1);
      isPowerOfTwo(4); isPowerOfTwo(3);
      isPowerOfTwo(8); isPowerOfTwo(7);
      isPowerOfTwo(16); isPowerOfTwo(15);

      hasPerms(7);
      hasPerms(4);
      hasPerms(2);

      giveWriteAndExecute();
      updatePermissions();

      twoComplement(8);
      twoComplement(-9);
   }

   public static void oddOrEven(Integer number) {
      if ((number & 1) == 1) System.out.println("number " + number + " is odd");
      else System.out.println("number " + number + " is even");
   }

   public static void isPowerOfTwo(Integer number) {
      if((number & (number - 1)) == 0) System.out.println("number " + number + "  is a power of 2");
      else System.out.println("number " + number + " isn't a power of 2");
```

```
    }

    public static void hasPerms(Integer permission) {
        int userPermissions = permission;

        if ((userPermissions & READ) != 0)
            System.out.println("User with " + permission + " permission has read permissions");
        else
            System.out.println("User with " + permission +  " permission can't read. No permissions.");
    }

    public static void giveWriteAndExecute() {
        int userPermissions = WRITE | EXECUTE;
        System.out.println("User permissions: "+userPermissions);
    }

    public static void updatePermissions() {
        int userPermissions = 6;
        int userPermissionsUpdated = userPermissions ^ WRITE;
        System.out.println("User permissions: " + userPermissionsUpdated);
    }

    public static void twoComplement(Integer number) {
        number = ~number + 1;
        System.out.println("Number: " + number);
    }
}
```

**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?

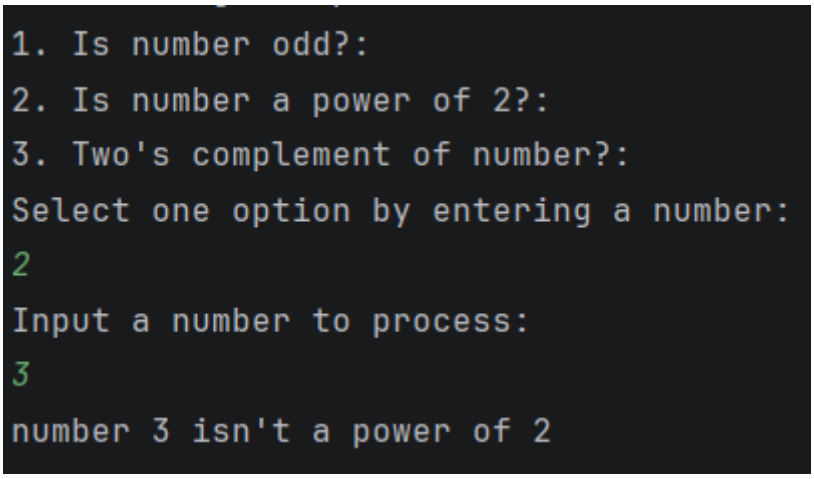
Implement the methods by using the bitwise operators you have just learned.

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.

```
Import java.util.Scanner;

public class Main {
    static final int READ = 4;
    static final int WRITE = 2;
    static final int EXECUTE = 1;
```

```
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        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("Select one option by entering a number: ");
        int option = Integer.parseInt(scanner.nextLine());

        System.out.println("Input a number to process: ");
        int number = Integer.parseInt(scanner.nextLine());

        if (option == 1) {
            oddOrEven(number);
        } else if (option == 2) {
            isPowerOfTwo(number);
        } else if (option == 3) {
            twoComplement(3);
        }
    }

    public static void oddOrEven(Integer number) {
        if ((number & 1) == 1) System.out.println("number " + number + " is odd");
        else System.out.println("number " + number + " is even");
    }

    public static void isPowerOfTwo(Integer number) {
        if((number & (number - 1)) == 0) System.out.println("number " + number + "  is a power of 2");
        else System.out.println("number " + number + " isn't a power of 2");
    }

    public static void twoComplement(Integer number) {
        number = ~number + 1;
        System.out.println("Number: " + number);
    }
}
```




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

Ready? Then save this file and export it as a pdf file with the name: **week2.pdf**