Template Week 2 – Logic

Student number: 583293

Assignment 2.1: Parking lot

Which gates do you need?

OR gates

Complete this table

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

Assignment 2.2: Android or iPhone

Which gates do you need?

OR

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

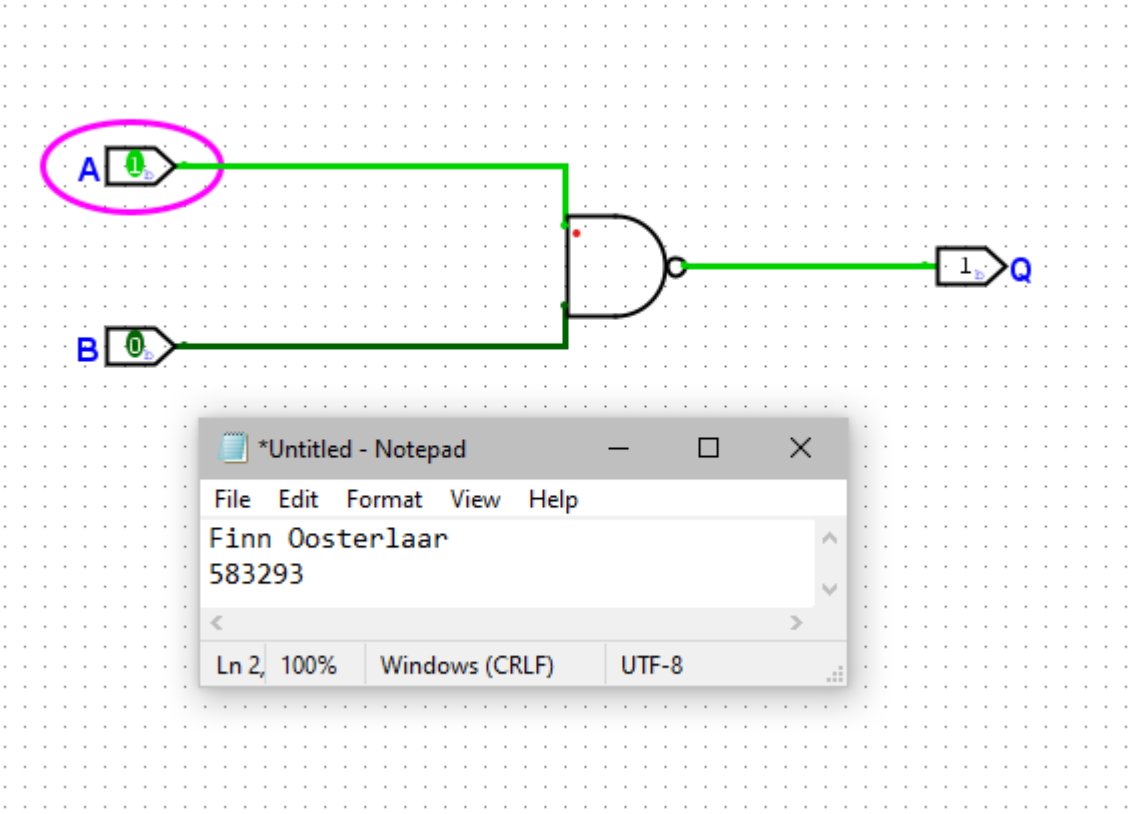
A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

How can the design be simplified?

Je kunt 1 NAND gate gebruiken

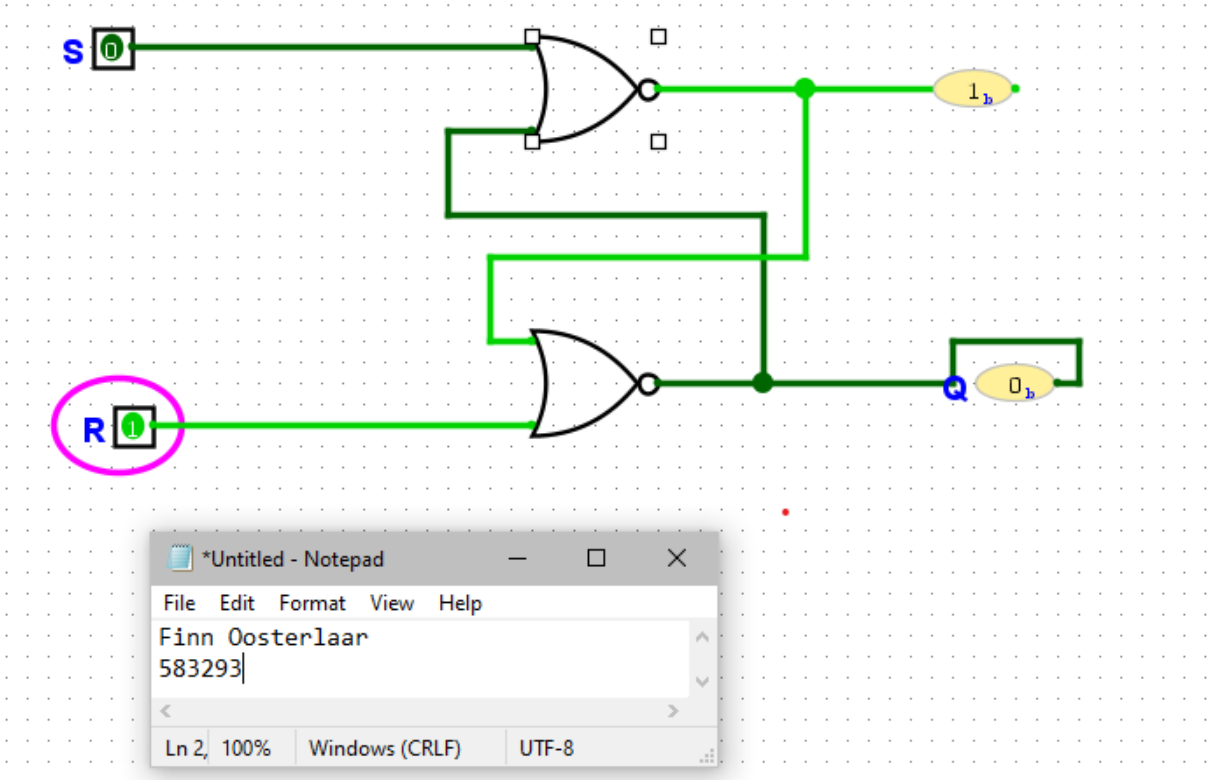
Assignment 2.4: Getting to know Logisim evolution

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



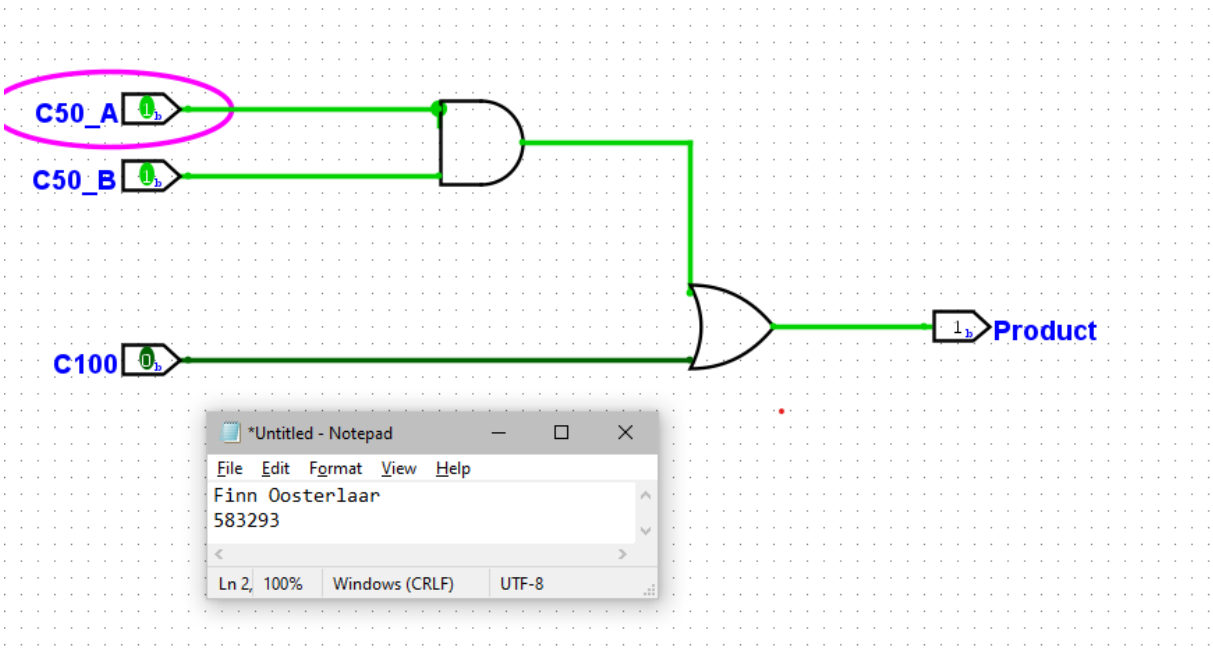
Assignment 2.5: SR Latch

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 {


   public static void main(String[] args) {
      int a = 12;   // 1100
      int b = 5;    // 0101


      System.out.println("a = " + a + " (1100)");
      System.out.println("b = " + b + " (0101)");


      System.out.println("a & b  = " + (a & b));   // AND
      System.out.println("a | b  = " + (a | b));   // OR
      System.out.println("a ^ b  = " + (a ^ b));   // XOR
      System.out.println("~a     = " + (~a));      // NOT
      System.out.println("a << 1 = " + (a << 1));  // Left shift
      System.out.println("a >> 1 = " + (a >> 1));  // Right shift


          }
}
```

Assignment 2.8: Java Application Bit Calculations

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

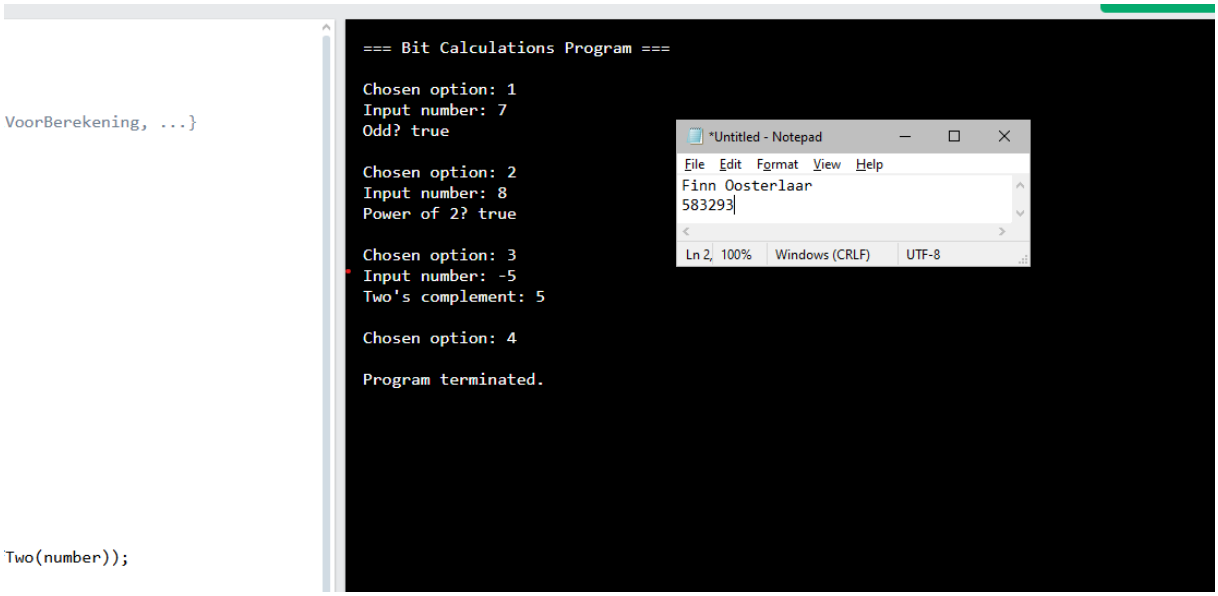
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

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 class Main {


    public static void main(String[] args) {
        // Simulatie van gebruikersinput
        // Formaat: {menuKeuze, getalVoorBerekening, menuKeuze, getalVoorBerekening, ...}
        // menuKeuze = 4 betekent "exit"
        int[] simulatedInput = {1, 7, 2, 8, 3, -5, 4};
        int inputIndex = 0;
        int choice = 0;

        System.out.println("=== Bit Calculations Program ===");

        while (inputIndex < simulatedInput.length) {
            choice = simulatedInput[inputIndex++];
            System.out.println("\nChosen option: " + choice);

            if (choice >= 1 && choice <= 3) {
                int number = simulatedInput[inputIndex++];
                System.out.println("Input number: " + number);
```

```
            switch (choice) {
                case 1:
                    System.out.println("Odd? " + isOdd(number));
                    break;
                case 2:
                    System.out.println("Power of 2? " + isPowerOfTwo(number));
                    break;
                case 3:
                    System.out.println("Two's complement: " + twosComplement(number));
                    break;
            }
        } else if (choice == 4) {
            break; // exit
        } else {
            System.out.println("Invalid choice!");
        }
    }

    System.out.println("\nProgram terminated.");
}

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

// Check if number is a power of 2 using bitwise operators
public static boolean isPowerOfTwo(int number) {
    return number > 0 && (number & (number - 1)) == 0;
}
```

```
    // Calculate two's complement using bitwise NOT and addition
    public static int twosComplement(int number) {
        return (~number) + 1;
    }
}
```

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