Template Week 2 – Logic

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Assignment 2.1: Parking lot

Which gates do you need?
One AND gate.
Output becomes 1 when all three parking sensors are 1.

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?
One XOR gate.
Output becomes 1 when only one of the two choices are 1.

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

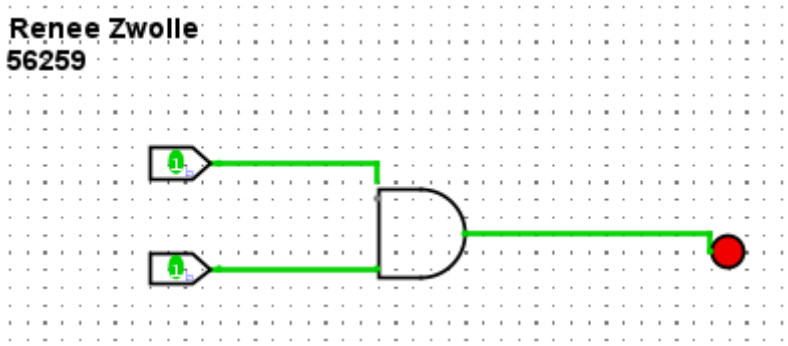
Complete this table

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

How can the design be simplified?
Use a XOR gate since the tables end up being the same.

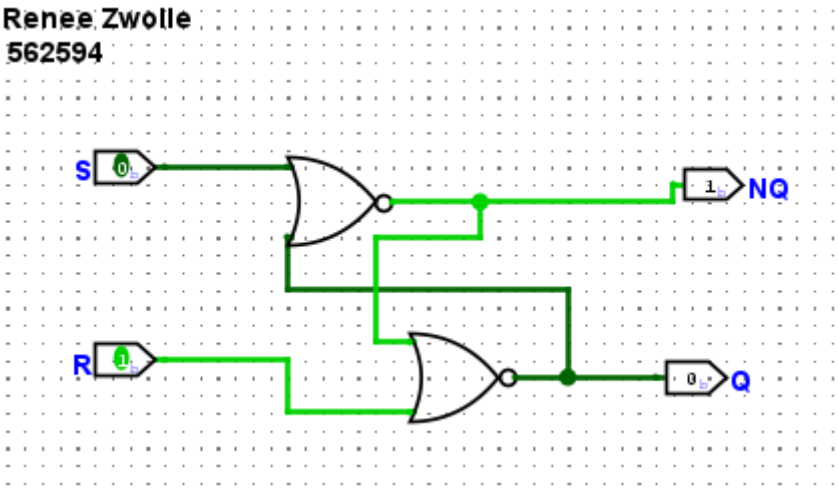
Assignment 2.4: Getting to know Logisim evolution

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:

Tis niet gelukt niet die SR Latch.

Assignment 2.7: Bitwise operators

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

```
public class OddCheck {
   public static boolean isOdd(int n) {
      return (n / 2) * 2 != n;
   }
}
```

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.

```
import java.util.Scanner;

public class BitwiseMenu {

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

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

      int choice;
      do {
         System.out.println("\n--- 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:
                    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;

                case 4:
                    System.out.println("Goodbye!");
                    break;

                default:
                    System.out.println("Invalid choice, try again.");
            }

        } while (choice != 4);

        scanner.close();
    }

    public static boolean isOdd(int n) {
        return (n & 1) == 1;
    }

    public static boolean isPowerOfTwo(int n) {

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

    public static int twosComplement(int n) {
        return (~n) + 1;
    }
}
```

```
Enter an integer: 1

--- MENU ---
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Enter your choice: 1
Odd? true
```

```
--- MENU ---
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Enter your choice: 2
Power of 2? true
```

```
--- MENU ---
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Enter your choice: 3
Two's complement: -1
```