Template Week 2 – Logic

Student number: 582031

Assignment 2.1: Parking lot

Which gates do you need?

AND

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	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

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	0
1	0	0
1	1	1

How can the design be simplified?
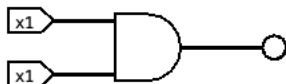
Alle NAND poorten kan je vervangen door een AND gate

$Q = A \cdot B$

Assignment 2.4: Getting to know Logisim evolution

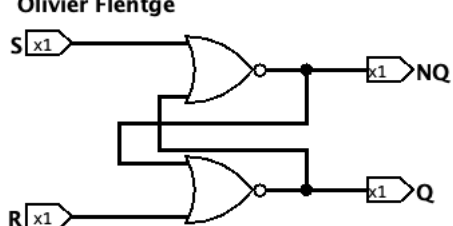Screenshot of the design with your name and student number in it:

Assignment 2.5: SR Latch
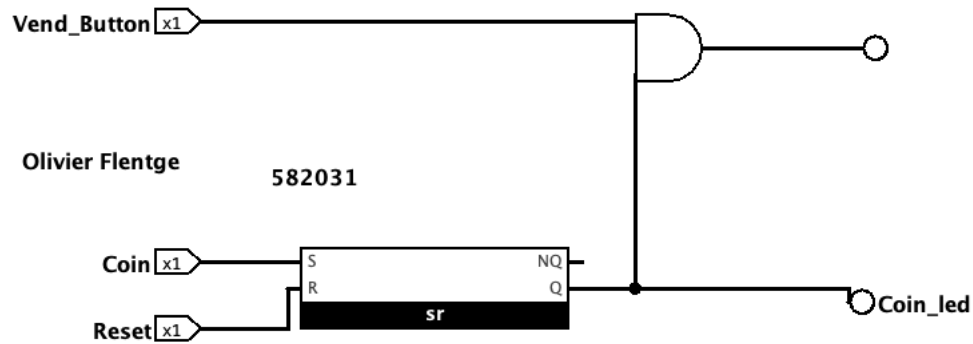
Screenshot SR Latch in Logisim with your name and student number:

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.

```java
public class Main {

    public static void main(String[] args) {

        int number = 5;

        if ((number & 1) == 1) System.out.println("number is odd");

        else System.out.println("number is even");

    }

}
```

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.

```java
import java.util.Scanner;

public class Main {

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

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

        System.out.println("\nChoose an option:");
        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.print("Your choice: ");

        int choice = scanner.nextInt();
        System.out.println();

        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:
                int twosComp = twosComplement(number);
                System.out.println("Two's complement of " + number + " is: " + twosComp);
                break;

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

        scanner.close();
    }

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

    public static boolean isPowerOfTwo(int n) {
        if (n <= 0) return false;
```

```java
        return (n & (n - 1)) == 0;
    }

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

```
/opt/homebrew/opt/java/libexec/openjdk.jdk/Contents/Home/bin/java -javaagent:/Users/sympact/Applications/IntelliJ IDEA.app/Contents
Enter an integer number: 2

Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
Your choice: 1

2 is even.
```

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