Template Week 2 – Logic

Student number: 566107

Assignment 2.1: Parking lot

Which gates do you need? You will need 2 and gates to see if all the lots are filled

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

Assignment 2.2: Android/iPhone

Which gates do you need? You will need a XOR gate, as you can only pick one

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

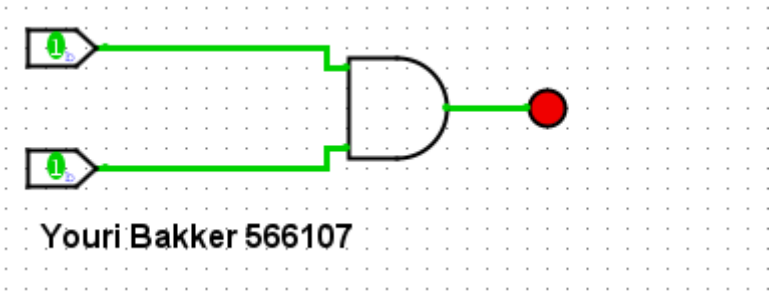
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

You could remove 2 NAND gates and change it so you have one NAND gate with takes input from A and B and get that output and use that with A or B and you will probably get the same results.

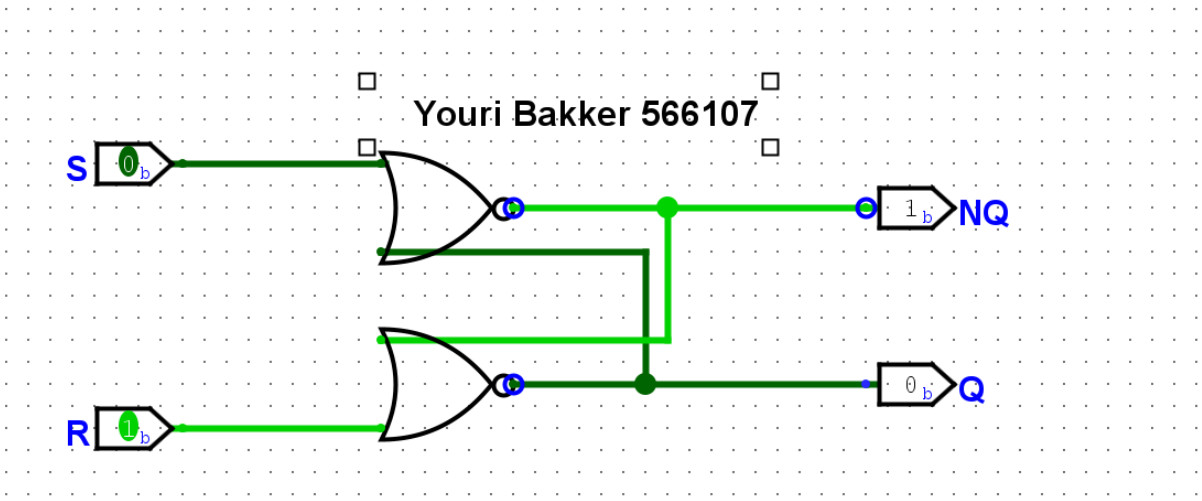
Assignment 2.4: Getting to know Logisim evolution

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



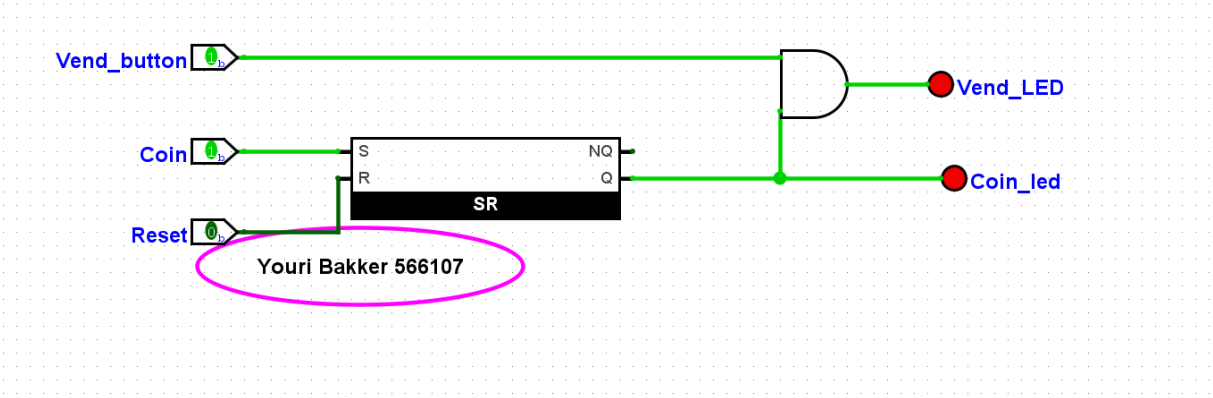
Assignment 2.5: SR Latch

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:



Bonus point assignment – week 2

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

1. Is number odd?

```
public static void numberIsEven(int number) {
    if((number & 1) == 0) {
        System.out.println("Number " + number + " is even");
    } else {
        System.out.println("Number " + number + " is odd");
    }
}
```

2. Is number a power of 2?

```
public static void numberIsPowerOfTwo(int number) {
    if((number & (number - 1)) == 0) {
        System.out.println("Number " + number + " is power of two");
    } else {
        System.out.println("Number " + number + " is not power of two");
    }
}
```

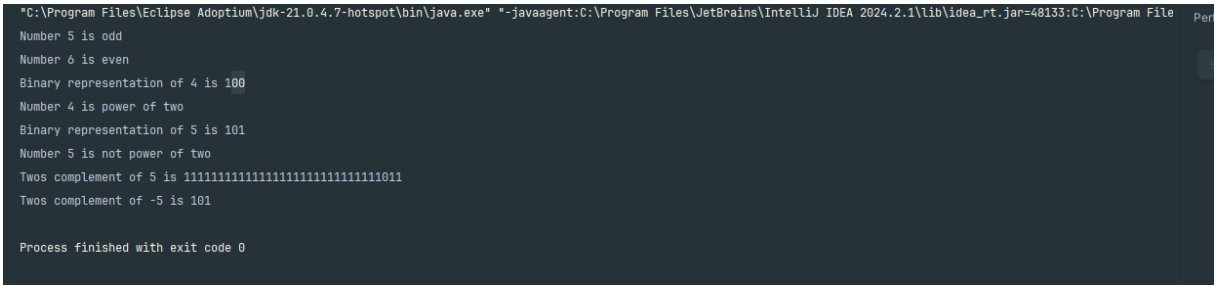
3. Two’s complement of number?

```java
/// Twos complement of a number is obtained by negating the number and adding 1
to it.
/// and thus the number will be the opposite of the number.
public static void twosComplement(int number) {
    System.out.println("Twos complement of " + number + " is " +
Integer.toBinaryString(~number + 1));
}
```

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.

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**

```java
public class Main {
    public static void main(String[] args) {
        // 4 = 0100
        numberIsPowerOfTwo(4);
        // 5 = 0101
        numberIsPowerOfTwo(5);

        // 5 = 0101
        twosComplement( number: 5);
        // -5 = 1011
        twosComplement( number: -5);
    }

    /// If the least significant bit of the number is 0, then the number is even, otherwise it is odd.
    public static void numberIsEven(int number) {  2 usages
        if((number & 1) == 0) {
            System.out.println("Number " + number + " is even");
        } else {
            System.out.println("Number " + number + " is odd");
        }
    }

    /// If the number is power of two, then it will have only one bit set in its binary representation.
    public static void numberIsPowerOfTwo(int number) {  2 usages
        if((number & (number - 1)) == 0) {
            System.out.println("Number " + number + " is power of two");
        } else {
            System.out.println("Number " + number + " is not power of two");
        }
    }

    /// Twos complement of a number is obtained by negating the number and adding 1 to it.
    /// and thus the number will be the opposite of the number.
    public static void twosComplement(int number) {  2 usages
        System.out.println("Twos complement of " + number + " is " + Integer.toBinaryString( i: ~number + 1));
    }
```