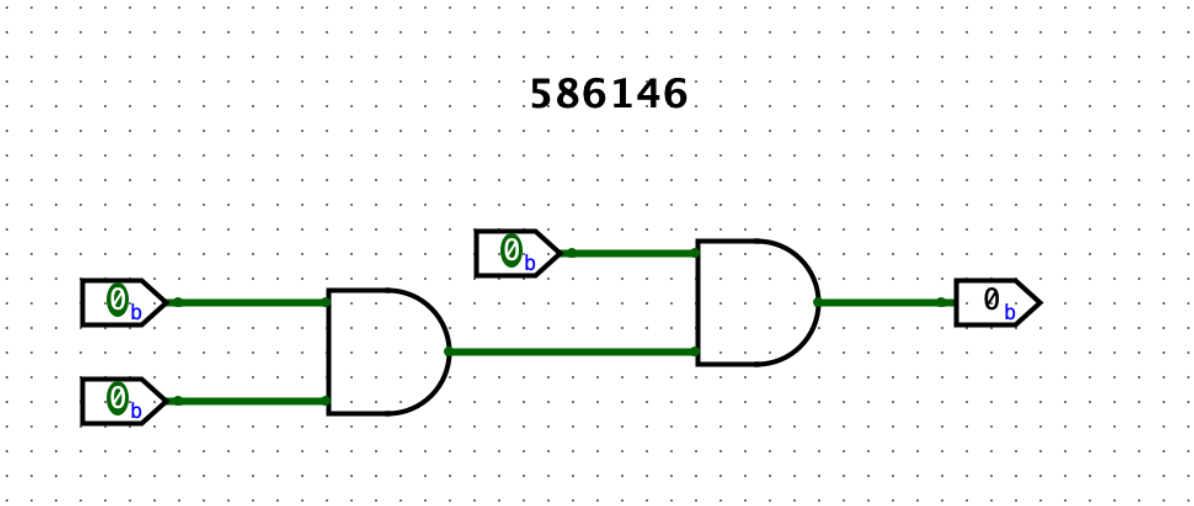
# Template Week 2 – Logic

Student number: 586146

**Assignment 2.1: Parking lot**

We need AND gates (two of them).

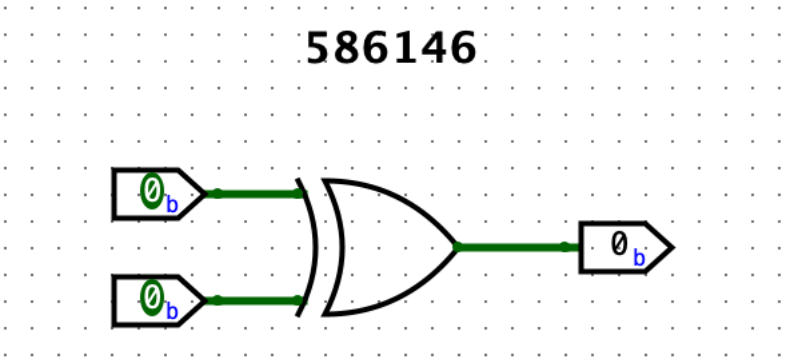



Complete this table

| 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**

We need a XOR gate.




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**

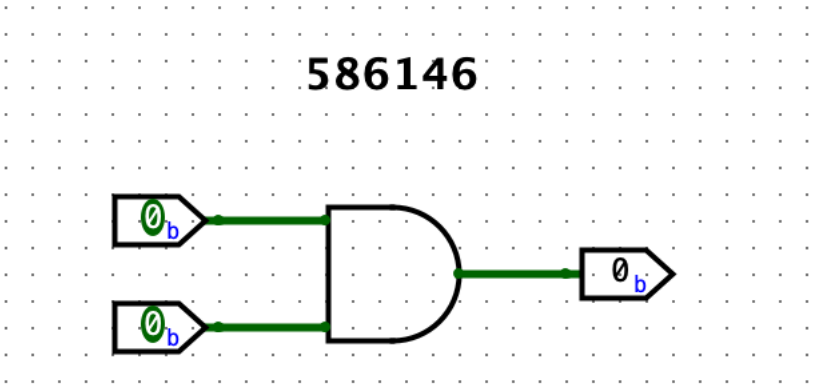
Complete this table

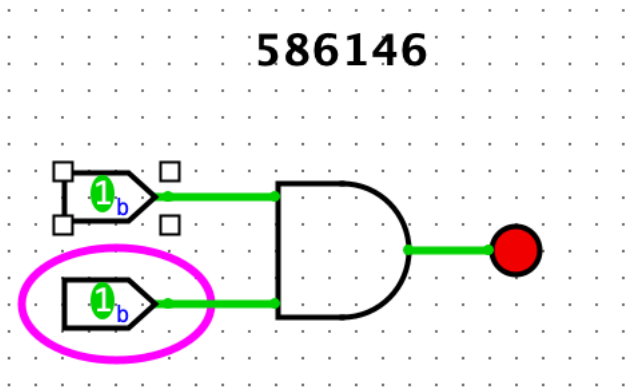
| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

We could simplify this gate by making use of a XOR gate.

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

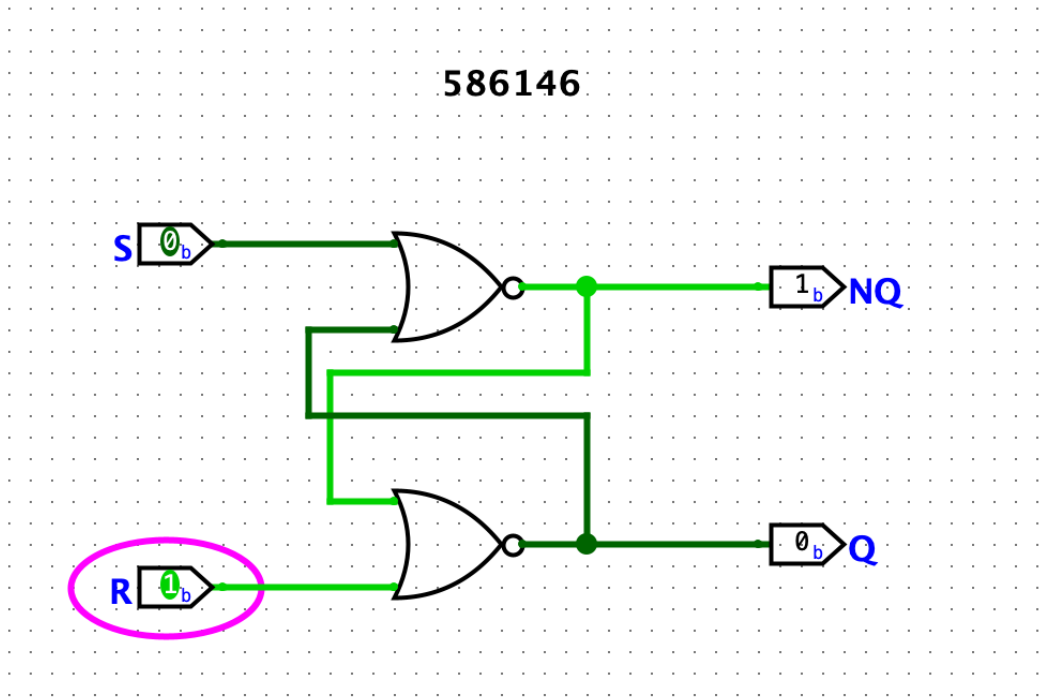
Screenshot of the design with your name and student number in it:



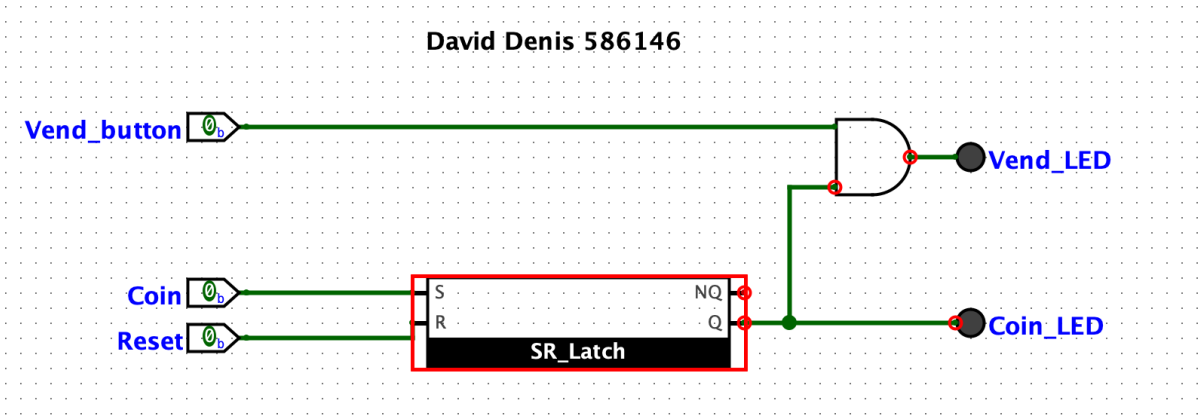

**Assignment 2.5: SR Latch**

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.

Even or Odd:

```
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");
   }
}
```

Power of 2:

```
public class Main {
   public static void main(String[] args) {
      int number = 4;

      if ((number & (number - 1)) == 0 && number > 0)
         System.out.println("number is a power of 2");
      else
         System.out.println("number isn't a power of 2");
   }
}
```

**Assignment 2.8: Java Application Bit Calculations**

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

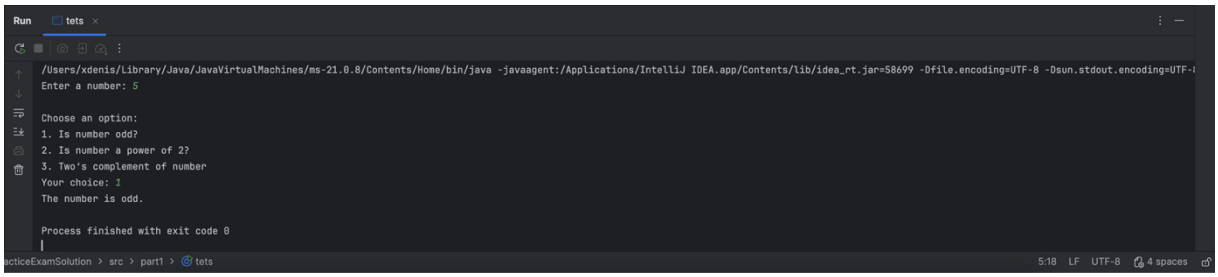
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

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.




```
package part1;

import java.util.Scanner;

public class tets {

    // Even or Odd
    public static boolean isOdd(int n) {
        return (n & 1) == 1;
    }

    // Power of 2
    public static boolean isPowerOfTwo(int n) {
        return n > 0 && (n & (n - 1)) == 0;
    }

    // 3. Two's complement
    public static int twosComplement(int n) {
        return (~n) + 1;
    }
```

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

    System.out.print("Enter a 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();

    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 isn't a power of 2.");
            break;

        case 3:
            System.out.println("Two's complement: " + twosComplement(number));
```

```
            break;

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

    scanner.close();
  }
}
```

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