

# Week 2 – Logic

Student number: 581124

## Assignment 2.1: Parking lot

Which gates do you need?

AND gate

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             |
| 0             | 1             | 1             | 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 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 |
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 1 | 0 |

How can the design be simplified?

These four NAND gates can be simplified just in one XOR gate.

### Assignment 2.4: Getting to know Logisim evolution

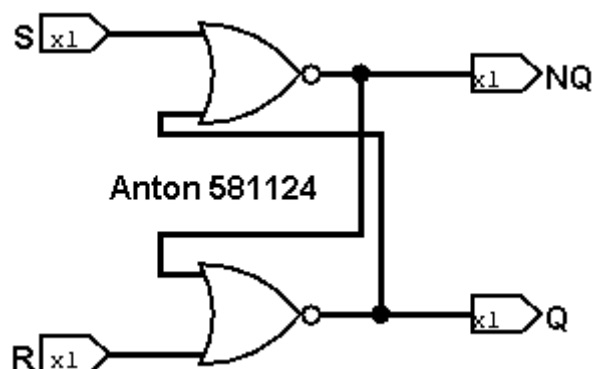
Screenshot of the design with your name and student number in it:

Anton 581124



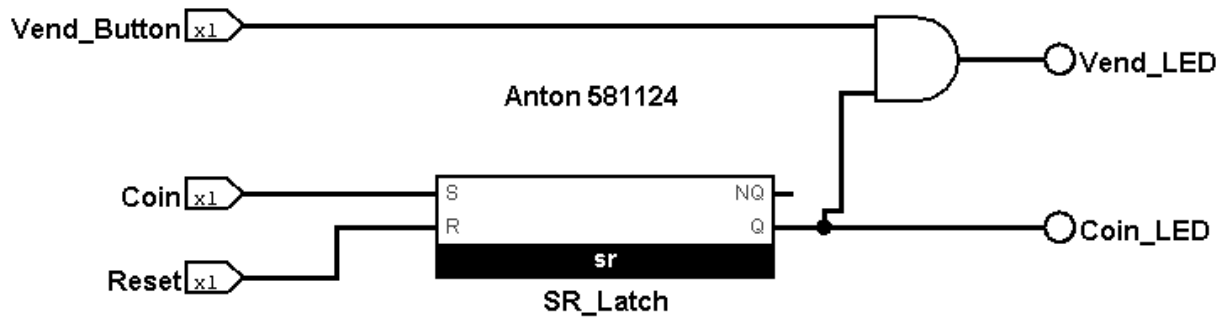
### Assignment 2.5: SR Latch

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.

#### Task 1

```
public class Main {
    public static void main(String[] args) {
        int number = 0;

        if((number & 1) == 1)
            System.out.println("number is odd");
        else
            System.out.println("number is even");
    }
}
```

#### Task 2

```
public class Main {
    public static void main(String[] args) {
        int number = 2;
        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");
    }
}
```

### Task 3

Permission for the file **verse** in Octal is: **644 (RW for User, R for Group, R for Others)**

```
public class Main {  
    public static void main(String[] args) {  
        final int READ = 4;  
        final int WRITE = 2;  
        final int EXECUTE = 1;  
  
        int userPermissions = 4;  
  
        if((userPermissions & READ) == READ) System.out.println("User has read permissions");  
        else System.out.println("User can't read. No permissions.");  
    }  
}
```

### Task 4

```
public class Main {  
    public static void main(String[] args) {  
        final int READ = 4;  
        final int WRITE = 2;  
        final int EXECUTE = 1;  
  
        int userPermissions = READ | EXECUTE;  
        System.out.println("User permissions: " + userPermissions);  
    }  
}
```

### Task 5

```
public class Main {  
    public static void main(String[] args) {  
        final int READ = 4;  
        final int WRITE = 2;  
        final int EXECUTE = 1;
```

```

        int userPermissions = 6;

        userPermissions = userPermissions ^ WRITE;

        System.out.println("User permissions: "+userPermissions);

    }
}

```

#### **Task 6**

```

public class Main {

    public static void main(String[] args) {

        int number = 5;

        number = ~number + 1;

        System.out.println("Number: "+ number);

    }

}

```

#### **Task 7**

```

public class Main {

    public static void main(String[] args) {

        int number = 10;

        System.out.println("Decimal integer: "+number);

        String binary = Integer.toBinaryString(number);

        String octal = Integer.toOctalString(number);

        String hexadecimal = Integer.toHexString(number);

        System.out.println("Binary representation: " + binary);

        System.out.println("Octal representation: " + octal);

        System.out.println("Hexadecimal representation: " + hexadecimal);

    }

}

```

## 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 nl.saxion.app.SaxionApp;

import java.awt.*;

public class Application implements Runnable {

    public static void main(String[] args) {
        SaxionApp.start(new Application(), 800, 800);
    }

    public void run() {
        displayMenu();
        boolean exit = false;

        while (!exit) {
            SaxionApp.println();
            SaxionApp.println("What do you want to know?");
            int choice = SaxionApp.readInt();

            SaxionApp.println("What is your number?");
            int number = SaxionApp.readInt();

            switch (choice) {
                case 1:
                    SaxionApp.println(isOdd(number));
                    break;
                case 2:
                    SaxionApp.println(isPowerOfTwo(number));
                    break;
                case 3:
                    SaxionApp.println("Two's complement of " + number + " is: " +
getComplementOfNumber(number));
                    break;
```

```

        case 0:
            exit = true;
            break;
        default:
            SaxionApp.println("There is no such option present!", Color.RED);
            break;
    }
}

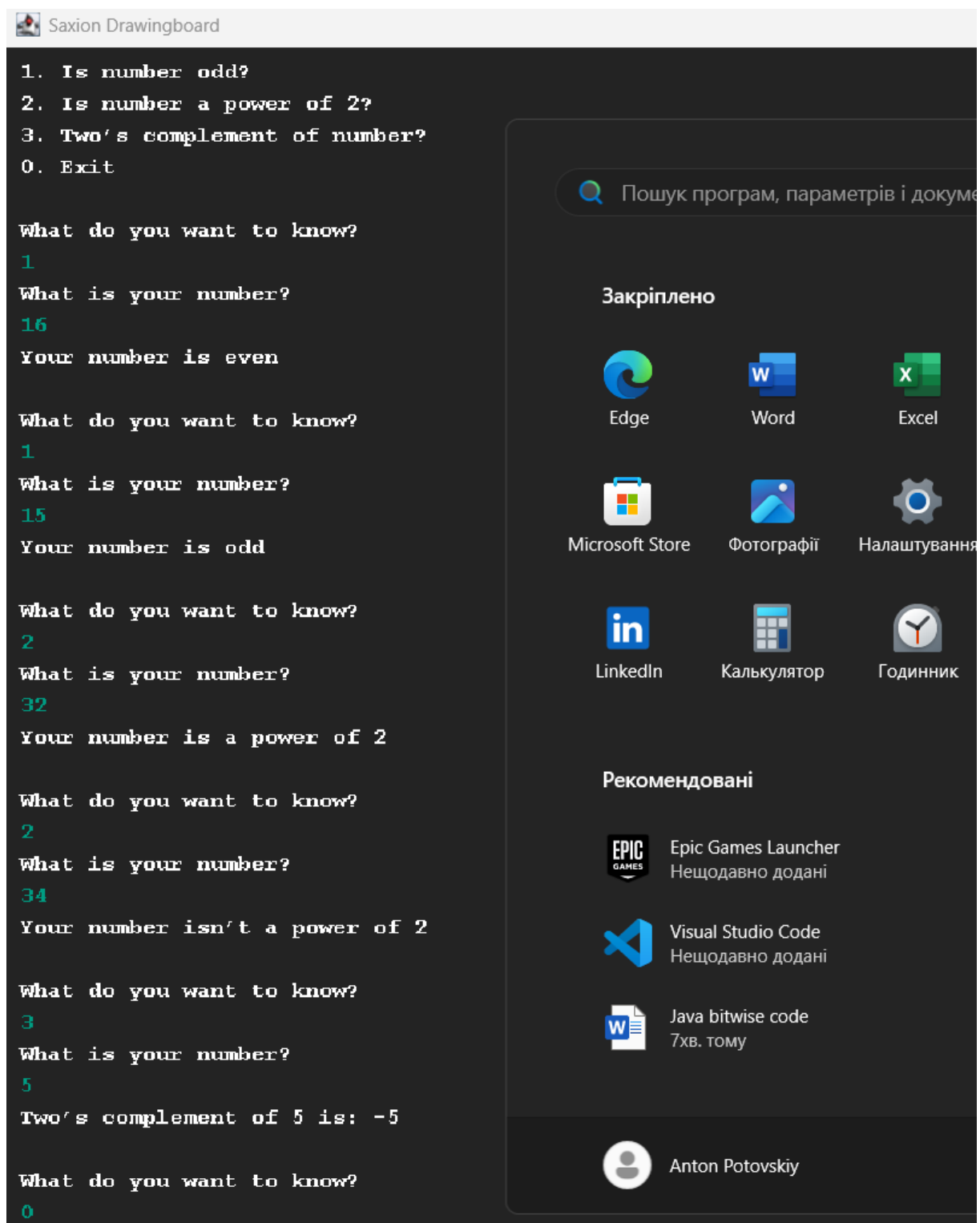
public String isOdd(int number) {
    if ((number & 1) == 1)
        return "Your number is odd";
    else
        return "Your number is even";
}

public String isPowerOfTwo(int number) {
    if (((number & (number - 1)) == 0) && number > 0)
        return "Your number is a power of 2";
    else
        return "Your number isn't a power of 2";
}

public int getComplementOfNumber(int number) {
    return number = ~number + 1;
}

public void displayMenu() {
    SaxionApp.println("Menu");
    SaxionApp.println();
    SaxionApp.println("1. Is number odd?");
    SaxionApp.println("2. Is number a power of 2?");
    SaxionApp.println("3. Two's complement of number?");
    SaxionApp.println("0. Exit");
}
}

```



Ready? Then save this file and export it as a pdf file with the name: [week2.pdf](#)