

# Week 2 – Logic.

Student number:

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## Assignment 2.1: Parking lot

Which gates do you need?

I need an 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
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?

I 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

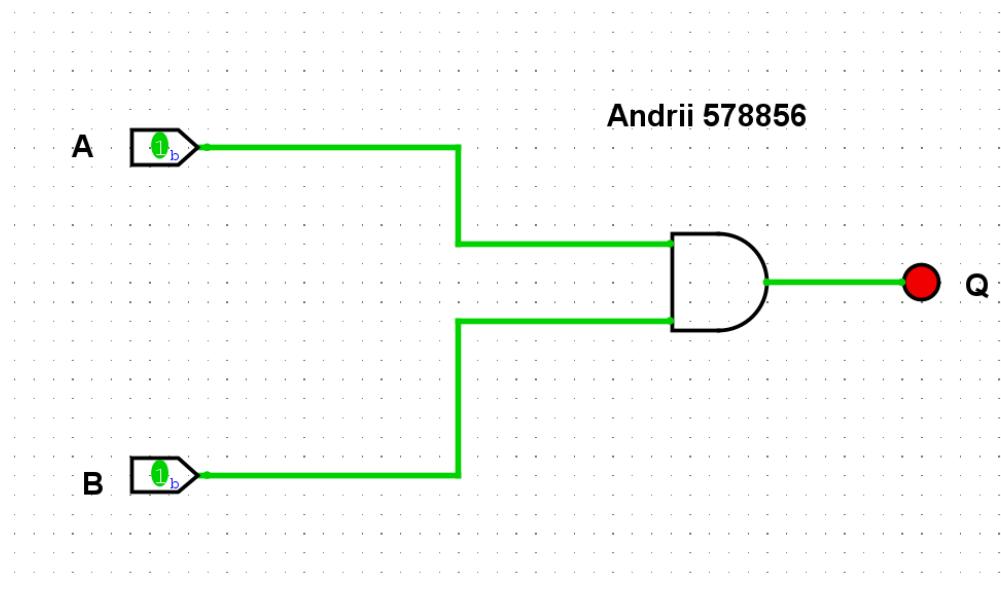
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

The design can be simplified by just using XOR gate instead of all NAND gates.

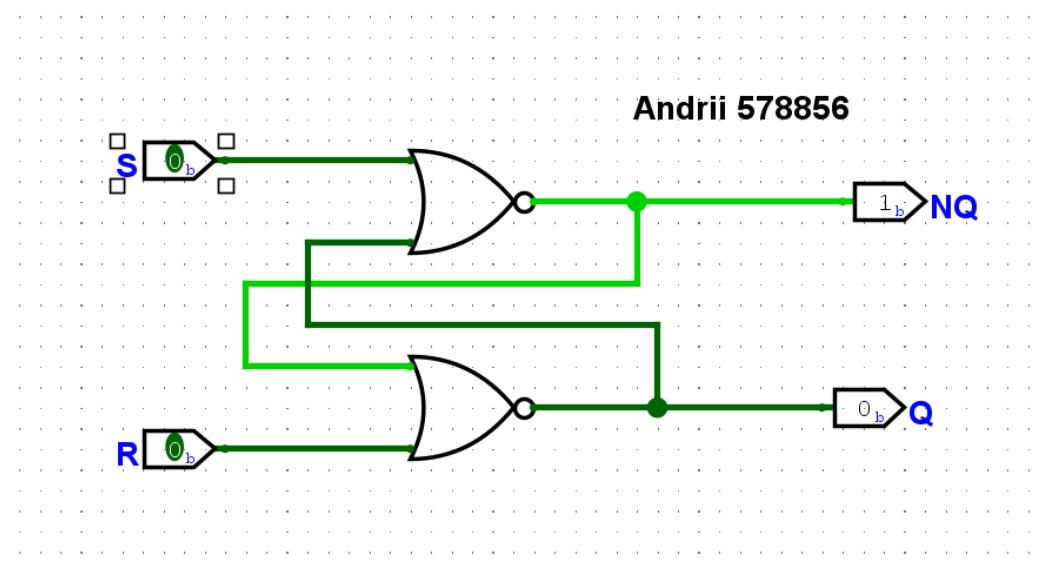
#### Assignment 2.4: Getting to know Logisim evolution

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



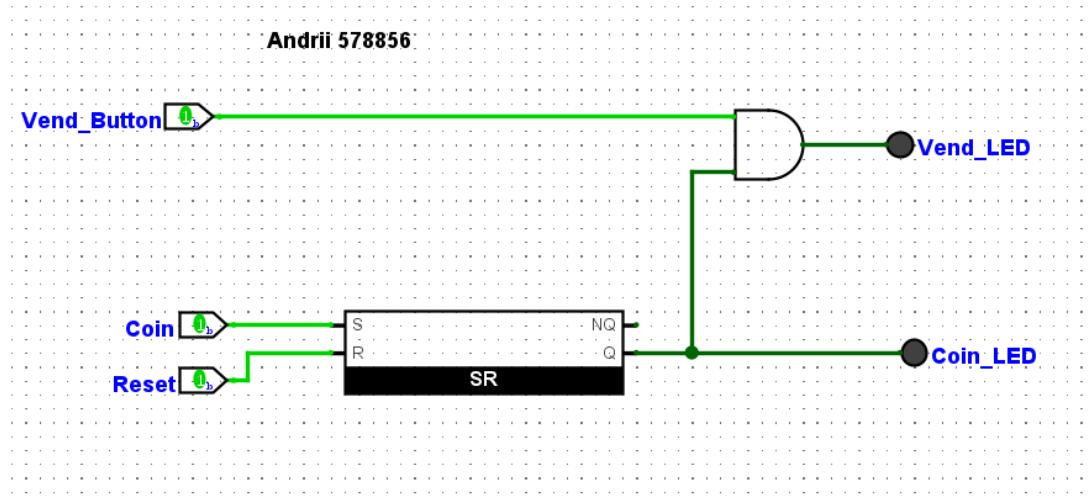
#### Assignment 2.5: SR Latch

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.

```
public class Main {  
    public static void main(String[] args) {  
        exercise1();  
        exercise2();  
        exercise3();  
        exercise4();  
        exercise5();  
        exercise6();  
        exercise7();  
    }  
  
    public static void exercise1(){  
        int number = 5;  
        if((number & 1) == 1){  
            System.out.println("number is odd");  
        }else{  
            System.out.println("number is even");  
        }  
    }  
}
```

```

public static void exercise2(){
    int number = 3;
    if((number & (number-1)) == 0){
        System.out.println("number is a power of 2");
    }
    else System.out.println("number isn't a power of 2");
}

public static void exercise3(){
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = 7;
    if ((userPermissions & READ) == 4 ){
        System.out.println("User has read permissions");
    }else {
        System.out.println("User can't read. No permissions.");
    }
}

public static void exercise4(){
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = READ | EXECUTE;
    System.out.println("User permissions: "+userPermissions);
}

public static void exercise5(){
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = 6;
    userPermissions = userPermissions ^ WRITE;
    System.out.println("User permissions: "+userPermissions);
}

public static void exercise6(){
    int number = 5;
    number = ~ (number - 1);
    System.out.println("Number: " + number);
}

```

```

public static void exercise7(){
    int number = 10;
    System.out.println("Decimal number is: " + number);

    String binary = Integer.toBinaryString(number);
    String octal = Integer.toOctalString(number);
    String hex = Integer.toHexString(number);

    System.out.println("Binary number: " + binary);
    System.out.println("Octal number: " + octal);
    System.out.println("Hex number: " + hex);
}
}

```

### 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.

```

C:\Users\aleho\.jdks\ms-21.0.8\bin\java.exe "-javaagent:C:\Program Files\JetBrains\Intel
Please, enter a decimal number: 16
1. Is number odd or even?
2. Is number power of 2?
3. Two's complement number?
0. Exit a program
Please, select and option: 1

The number 16 is even

1. Is number odd or even?
2. Is number power of 2?
3. Two's complement number?
0. Exit a program
Please, select and option: 2

The number 16 is a power of 2

1. Is number odd or even?
2. Is number power of 2?
3. Two's complement number?
0. Exit a program
Please, select and option: 3

The two's complement of number 16 is -16

```

```

import java.util.Scanner;

public class Main {

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

        System.out.print("Please, enter a decimal number: ");
        int decimalNumber = scanner.nextInt();

        while (continueProgram){
            printMenu();
            System.out.print("Please, select and option: ");
            int pickedOption = scanner.nextInt();
            System.out.println();

            if (pickedOption == 1){
                oddOrEven(decimalNumber);
            }else if(pickedOption == 2){
                checkIfPowerOfTwo(decimalNumber);
            }else if(pickedOption == 3 ){
                twosComplementNumber(decimalNumber);
            } else if (pickedOption == 0){
                continueProgram = false;
            }else {
                System.out.println("Invalid menu option");
            }
        }
        System.out.println("This is the end of a program");
    }

    public static void printMenu(){
        System.out.println("1. Is number odd or even?");
        System.out.println("2. Is number power of 2?");
        System.out.println("3. Two's complement number?");
        System.out.println("0. Exit a program");
    }

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

    public static void checkIfPowerOfTwo(int number){

```

```
if ((number & (number-1)) == 0){
    System.out.println("The number " + number + " is a power of 2");
} else {
    System.out.println("The number " + number + " is NOT a power of 2");
}
System.out.println();

}

public static void twosComplementNumber(int number){
    int result = (~number + 1);
    System.out.println("The two's complement of number " + number + " is " + result);
    System.out.println();
}
}
```