Template Week 2 – Logic

Student number: 589871

Assignment 2.1: Parking lot

Which gates do you need?

AND 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
0	1	1	0
1	0	0	0
1	1	0	0
1	0	1	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
1	0	1
0	1	1
1	1	0

Assignment 2.3: Four NAND gates

Complete this table

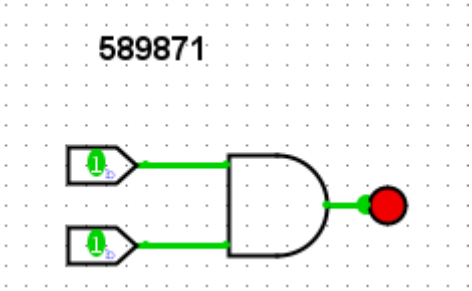
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

Using 1 XOR

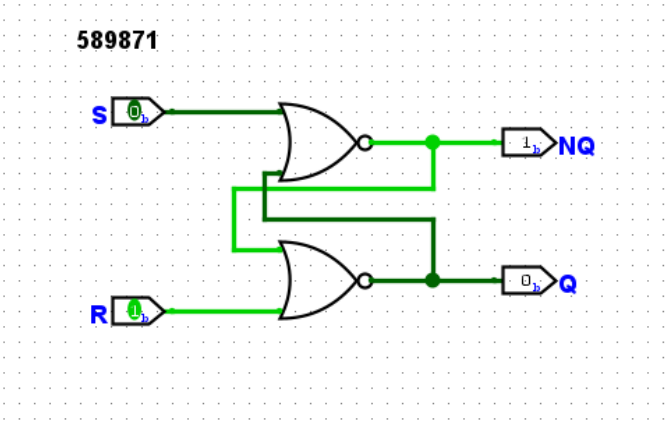
Assignment 2.4: Getting to know Logisim evolution

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



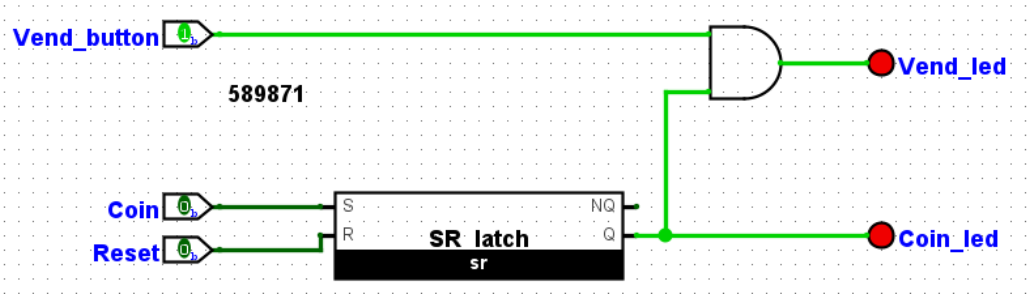
Assignment 2.5: SR Latch

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) {
    int number = 3;
    if((number & 1) == 1) System.out.println("number is odd");
    else System.out.println("number is even");
  }
}
```

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

    int userPermissions = 7;

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

```java
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);
  }
}
```

```java
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);
  }
}
```

```java
public class Main {
  public static void main(String[] args) {
    int number = 5;
    number = ~number + 1;

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

Assignment 2.8: Java Application Bit Calculations

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

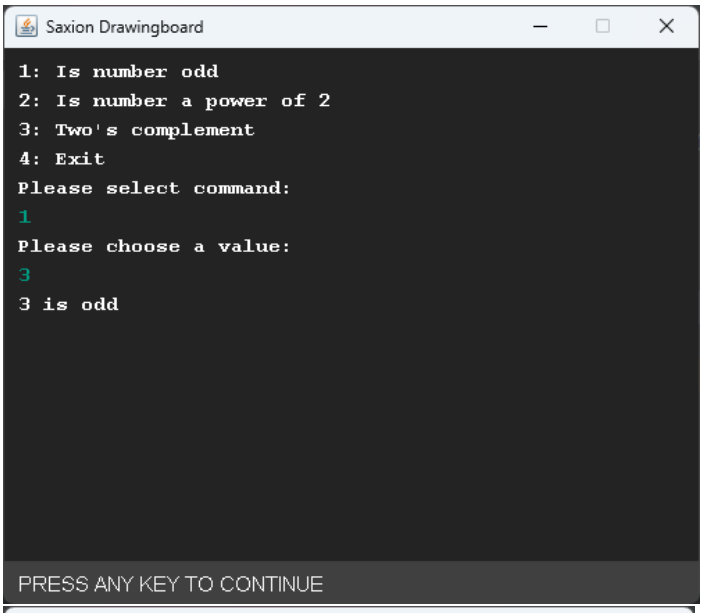
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

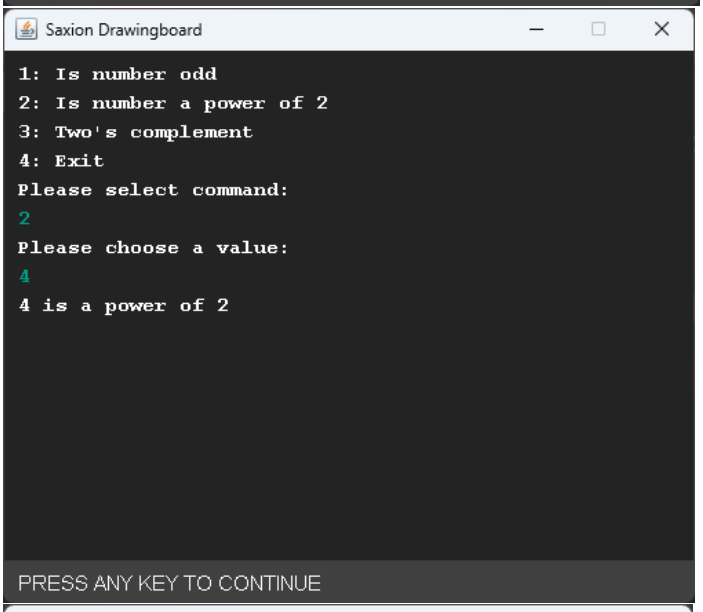
Implement the methods by using the bitwise operators you have just learned.

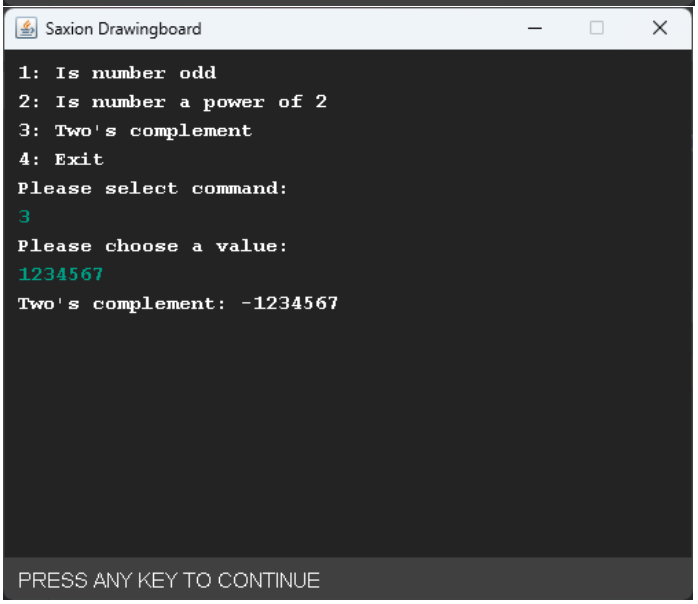
Organize your source code in a readable manner with the use of control flow and methods.

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.


Saxion Drawingboard
1: Is number odd
2: Is number a power of 2
3: Two's complement
4: Exit
Please select command:
1
Please choose a value:
3
3 is odd
PRESS ANY KEY TO CONTINUE


Saxion Drawingboard
1: Is number odd
2: Is number a power of 2
3: Two's complement
4: Exit
Please select command:
2
Please choose a value:
4
4 is a power of 2
PRESS ANY KEY TO CONTINUE


Saxion Drawingboard
1: Is number odd
2: Is number a power of 2
3: Two's complement
4: Exit
Please select command:
3
Please choose a value:
1234567
Two's complement: -1234567
PRESS ANY KEY TO CONTINUE

```
public class Application implements Runnable {
    public static void main(String[] args) {
        SaxionApp.start(new Application(), 500, 400);
    }

    public void run() {
        while (true) {
            SaxionApp.printLine("1: Is number odd");
            SaxionApp.printLine("2: Is number a power of 2");
            SaxionApp.printLine("3: Two's complement");
            SaxionApp.printLine("4: Exit");
            SaxionApp.printLine("Please select command: ");

            switch(SaxionApp.readInt()){
                case 1:
                    SaxionApp.printLine("Please choose a value: ");
                    isEven(SaxionApp.readInt());
                    break;

                case 2:
                    SaxionApp.printLine("Please choose a value: ");
                    isPowerOfTwo(SaxionApp.readInt());
                    break;

                case 3:
                    SaxionApp.printLine("Please choose a value: ");
                    twosComplement(SaxionApp.readInt());
                    break;

                case 4:
                    SaxionApp.quit();
                    break;

                default:
                    SaxionApp.printLine("Invalid command", Color.RED);
            }

            SaxionApp.pause();
            SaxionApp.clear();
        }
    }

    public void isEven(int input) {
        if((input & 1) == 1)
            SaxionApp.printLine(input+" is odd");
        else
            SaxionApp.printLine(input+" is even");
    }


    public void isPowerOfTwo(int input) {
        if((input & input - 1) == 0)
            SaxionApp.printLine(input+" is a power of 2");
        else
            SaxionApp.printLine(input+" is not a power of 2");
    }

    public void twosComplement(int input) {
        SaxionApp.printLine("Two's complement: "+(~input + 1));
    }
}
```