Template Week 2 – Logic

Student number: 578634

Assignment 2.1: Parking lot

Which gates do you need? AND gate with 3 inputs and one output

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 (FULL)

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

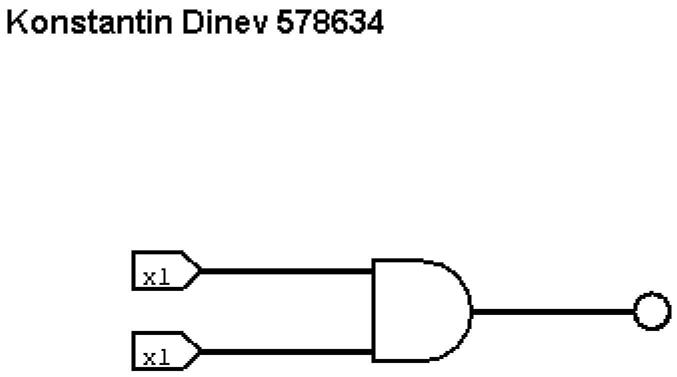
A	B	Q
0	0	1
1	0	1
0	1	1
1	1	0

How can the design be simplified?

This gate design can be simplified by using just a single 2-input NAND gate.

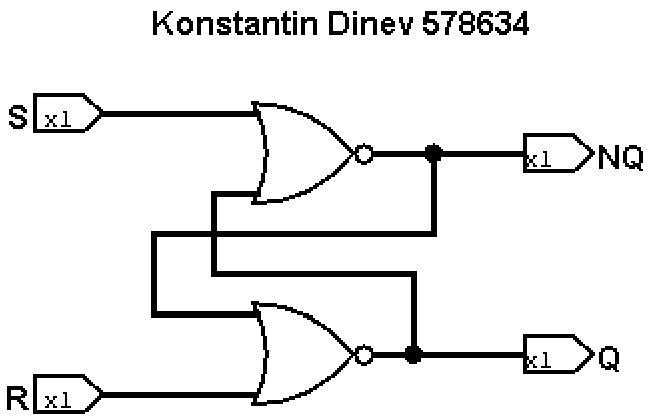
Assignment 2.4: Getting to know Logisim evolution

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



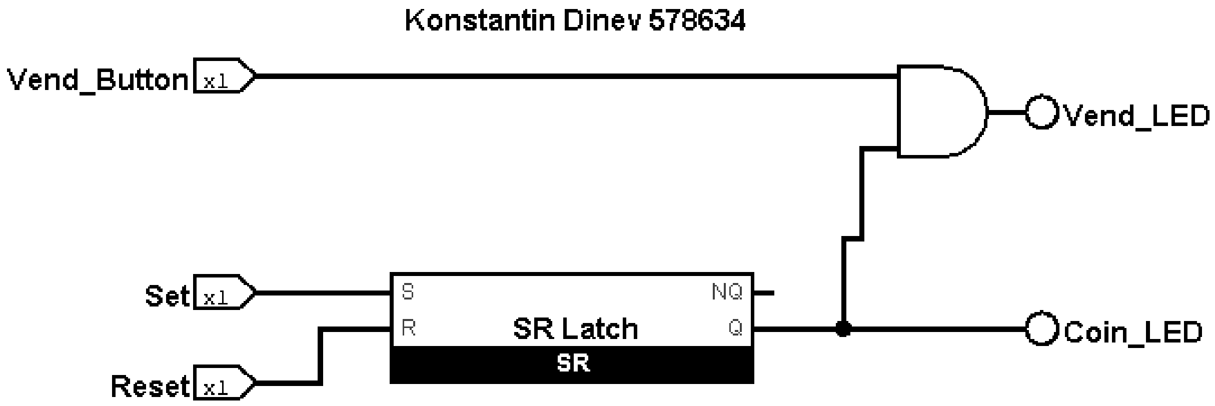
Assignment 2.5: SR Latch

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.

1

```
public class Main {
   public static void main(String[] args) {
      int number = 5;
      if ((number & 1) == 0) {
         System.out.println("number is even");
      } else {
         System.out.println("number is odd");
      }
   }
}
```

2

```
public class Main {
   public static void main(String[] args) {
      int number = 4;
      if (number > 0 && (number & (number - 1)) == 0) {
         System.out.println("number is a power of 2");
      } else {
         System.out.println("number isn’t a power of 2");
      }
   }
}
```

3

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

    int userPermissions = READ + WRITE + EXECUTE;

    int groupPermissions = READ + EXECUTE;

    int otherPermissions = READ + EXECUTE;

    String octalPermissions = "" + userPermissions + groupPermissions + otherPermissions;
    System.out.println("Octal permissions for 'verse': " + octalPermissions);

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

4

```
public class Main {
  public static void main(String[] args) {
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;
    int userPermissions = 0;

    userPermissions =  READ | EXECUTE;

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

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);
   }
}
```

6

```
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?

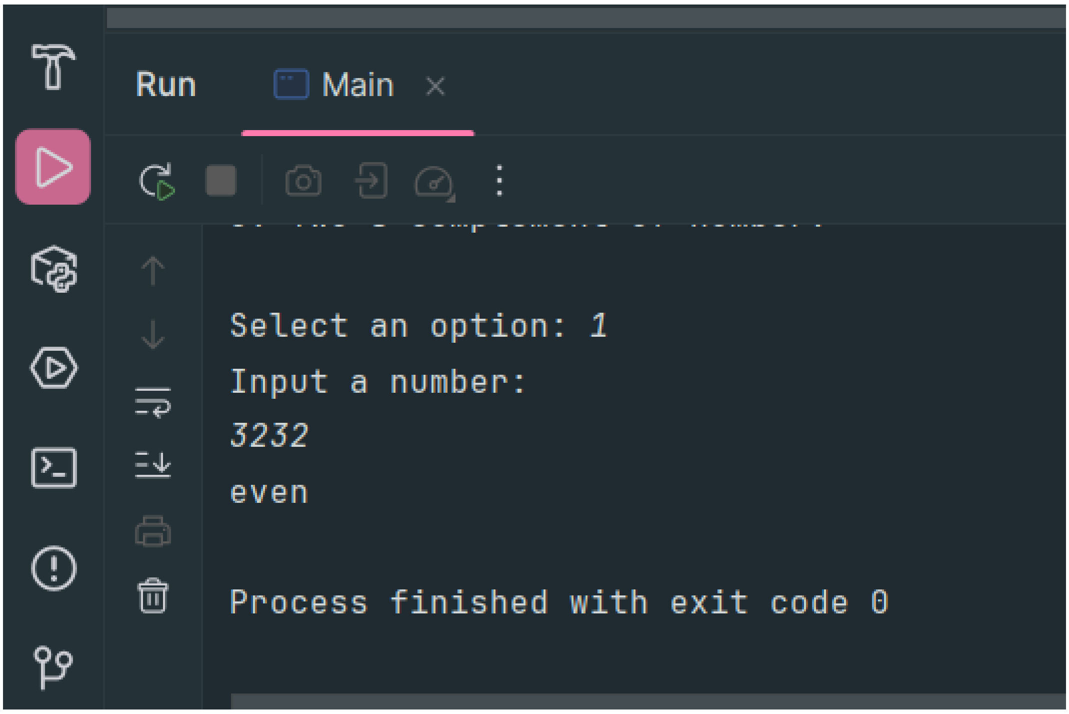
Implement the methods by using the bitwise operators you have just learned.

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

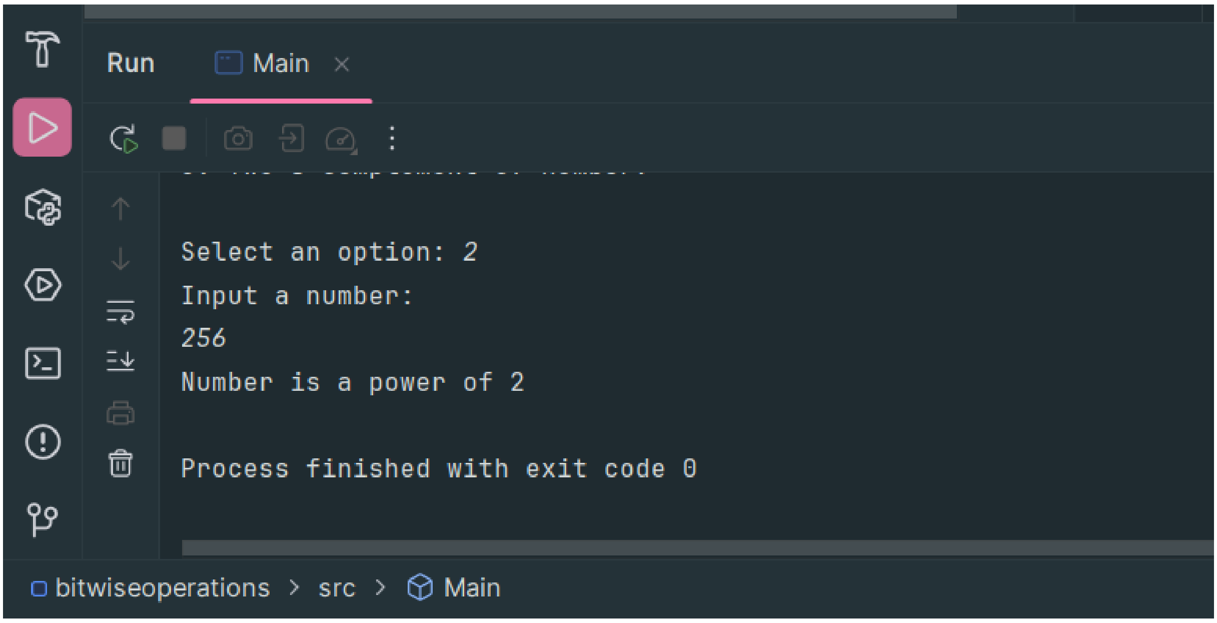
Keep this application because you need to expand it in week 6 for calculating network segments.

Paste source code here, with a screenshot of a working application.

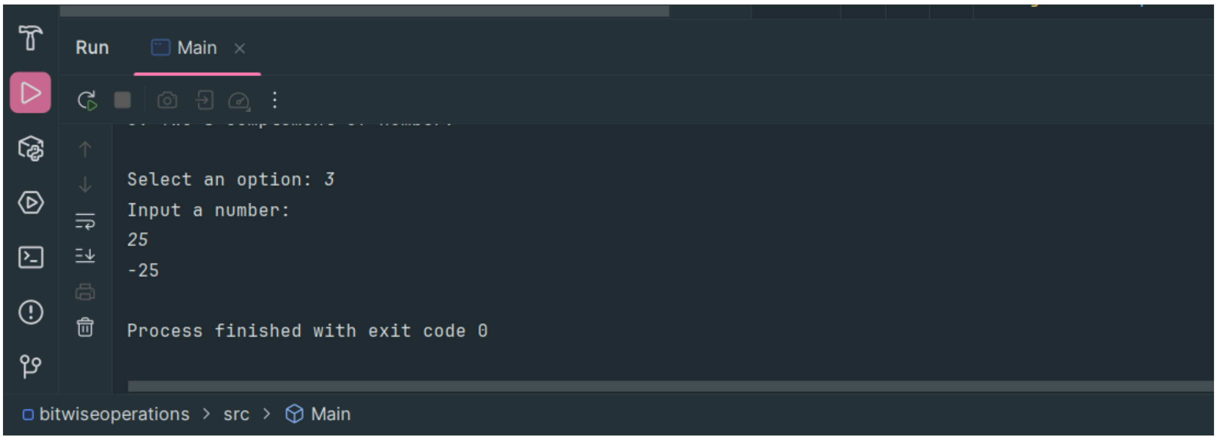
```java
import java.util.Scanner;

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

        printOptionMenu();

        int option = Integer.parseInt(scanner.nextLine());

        switch (option) {
            case 1: {
                System.out.println("Input a number: ");
                int number = Integer.parseInt(scanner.nextLine());

                isEven(number);
                break;
            }
            case 2: {
                System.out.println("Input a number: ");
                int number = Integer.parseInt(scanner.nextLine());

                isAPowerOfTwo(number);
                break;
            }
            case 3: {
                System.out.println("Input a number: ");
                int number = Integer.parseInt(scanner.nextLine());

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

    public static void isAPowerOfTwo(int number) {
        if ((number & -number) == number) {
            System.out.println("Number is a power of 2");
        } else {
            System.out.println("Number is not a power of 2");
        }
    }

    public static void printOptionMenu() {
        System.out.println("List of options: ");
        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?\n");
        System.out.print("Select an option: ");
    }


}
```



```
3. Two's complement of number?

Select an option: 1
Input a number:
3232
even

Process finished with exit code 0
```



```
Select an option: 2
Input a number:
256
Number is a power of 2

Process finished with exit code 0
```



```
Select an option: 3
Input a number:
25
-25

Process finished with exit code 0
```

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