Template Week 2 – Logic

Student number: 585902

Assignment 2.1: Parking lot

Which gates do you need? Two AND gates

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	1	0	0
1	0	1	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need? XOR – 4 NANDS

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

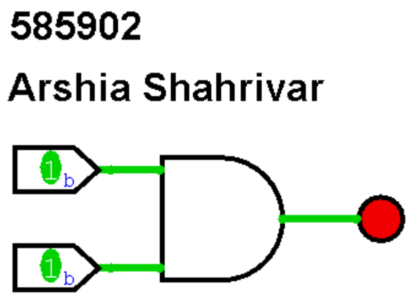
Complete this table

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

How can the design be simplified? One XOR

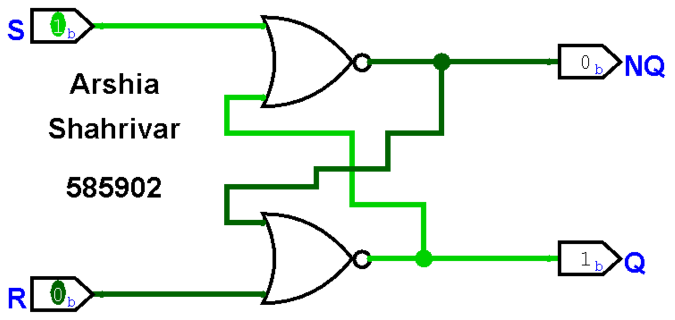
Assignment 2.4: Getting to know Logisim evolution

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



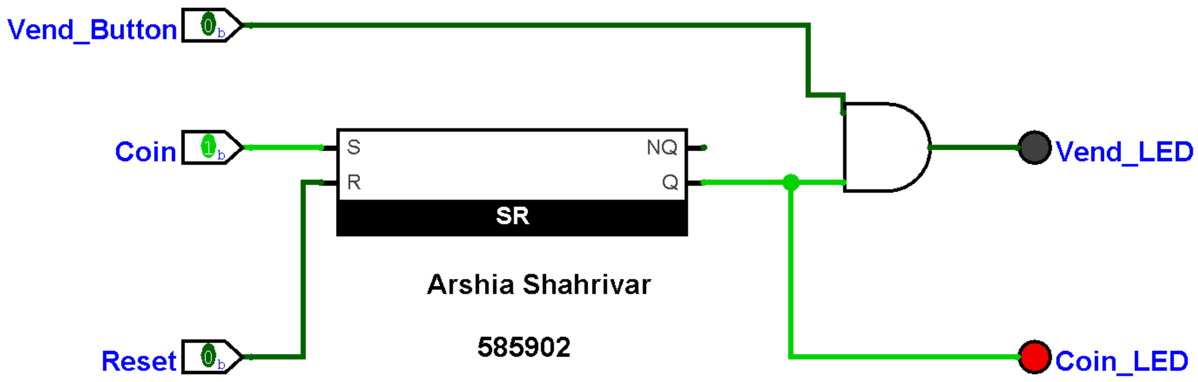
Assignment 2.5: SR Latch

Screenshot SR Latch in Logisim with your name and student number:



Assignment 2.6: Vending Machine

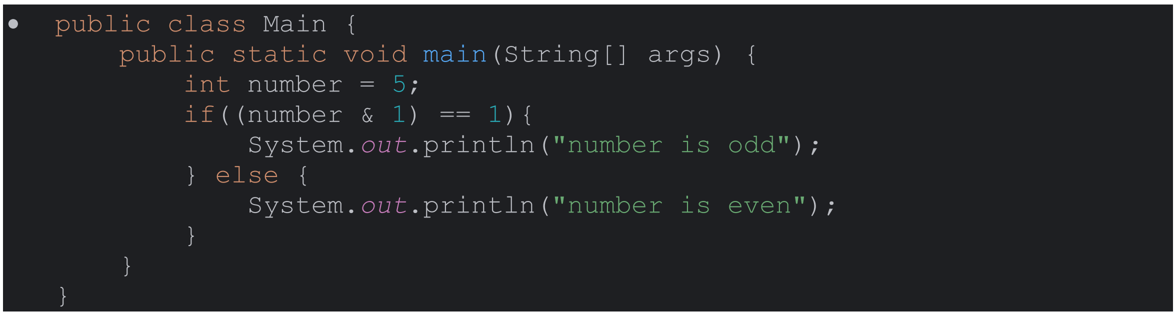
Screenshot Vending Machine in Logisim with your name and student number:



Assignment 2.7: Bitwise operators

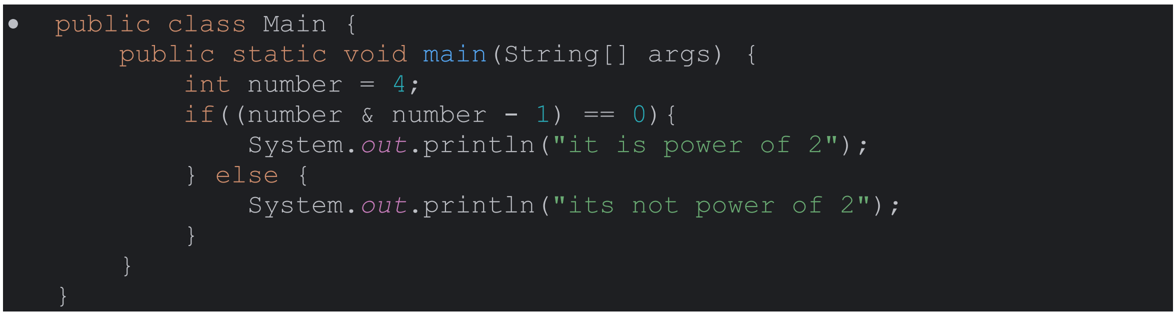
Complete the java source code for bitwise operators. Put the source code here.

- Checking if the number is 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");
          }
      }
  }
```

- Checking if the number is power of two:



```
• public class Main {
      public static void main(String[] args) {
          int number = 4;
          if((number & number - 1) == 0){
              System.out.println("it is power of 2");
          } else {
              System.out.println("its not power of 2");
          }
      }
  }
```

- Checking if user has read permissions:

```
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 & 4) == 4) {
            System.out.println("user has read permissions");
        } else {
            System.out.println("user doesnt have read permission");
        }
    }
}
```

- Changing the user permissions to have read + execute:

```
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);
    }
}
```

- Making the permissions to be read only:

```
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 ^= 2;
        System.out.println("user permissions: " + userPermissions);
    }
}
```

- reversing the sign of a number from positive to negative and vice versa:

```
public class Main {
    public static void main(String[] args) {
        int number = 5;
        number = ~number + 1;
        System.out.println("Number became: " + number);
    }
}
```

Assignment 2.8: Java Application Bit Calculations

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

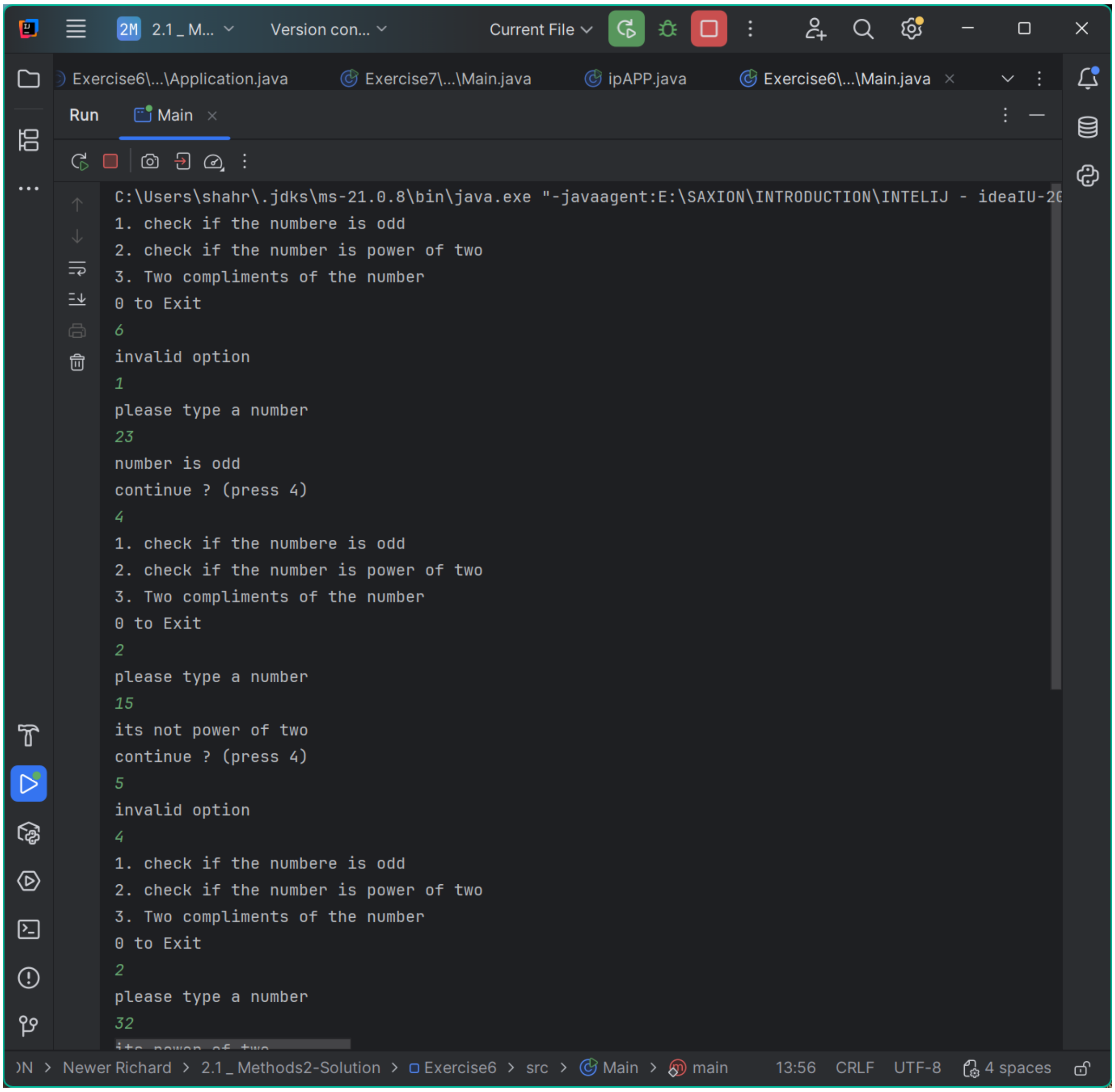
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

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.

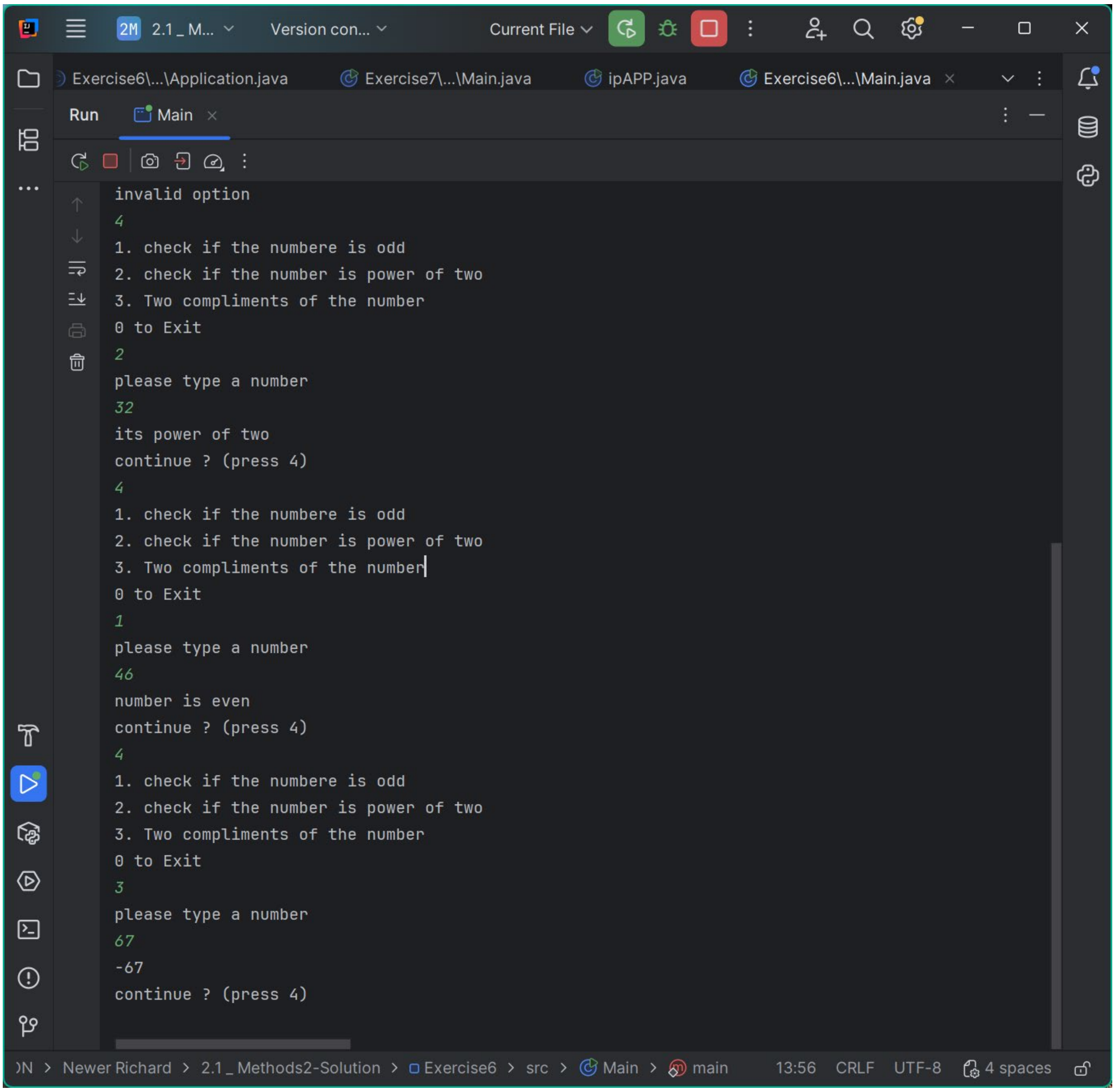
Keep this application because you need to expand it in week 6 for calculating network segments.

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



2M 2.1 _ M...
Version con...
Current File
Exercise6\...\Application.java
Exercise7\...\Main.java
ipAPP.java
Exercise6\...\Main.java
Run
Main
)N > Newer Richard > 2.1 _ Methods2-Solution > Exercise6 > src > Main > main
13:56 CRLF UTF-8 4 spaces

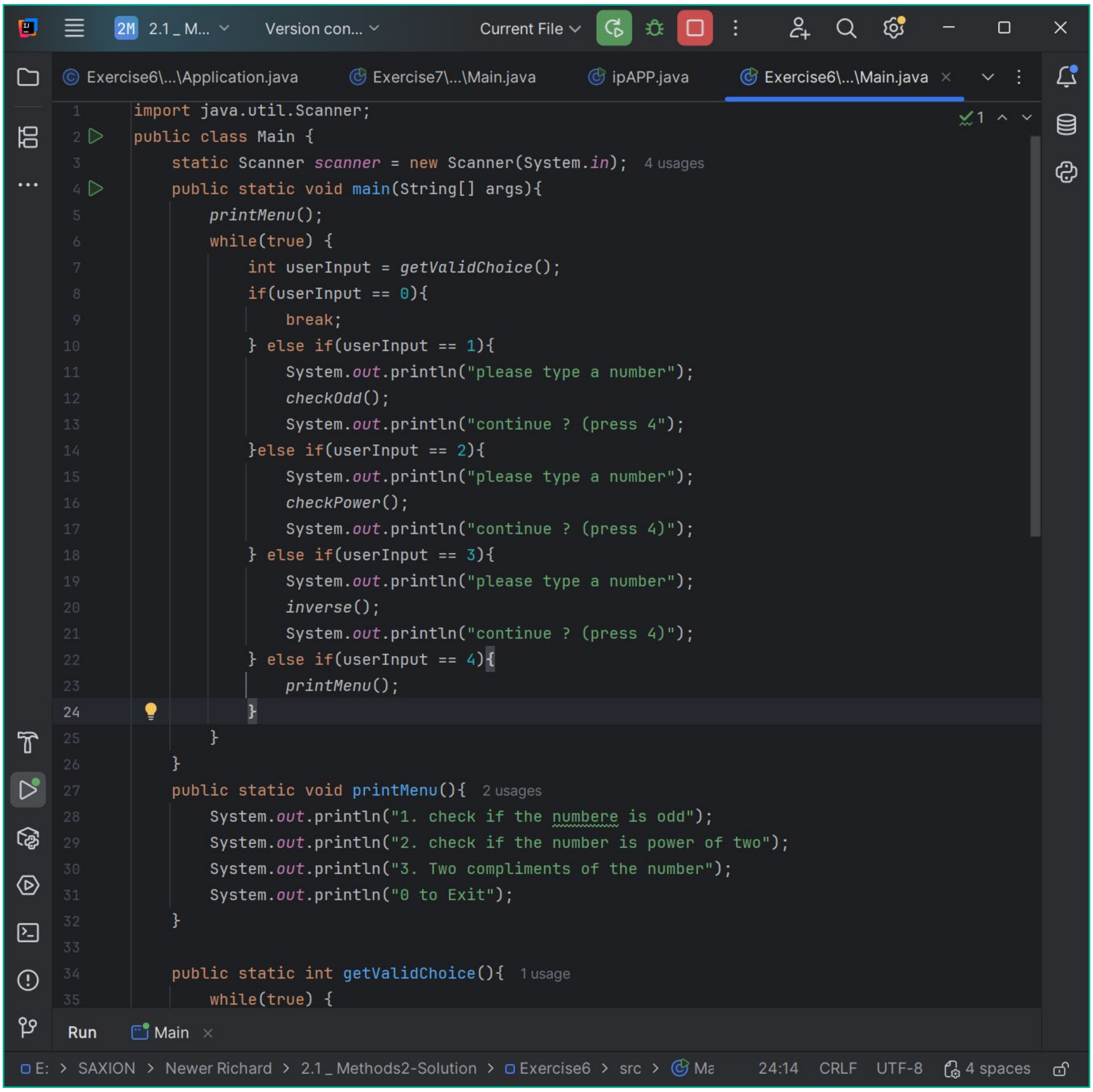
```
C:\Users\shahr\.jdks\ms-21.0.8\bin\java.exe "-javaagent:E:\SAXION\INTRODUCTION\INTELIJ - ideaIU-20
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
6
invalid option
1
please type a number
23
number is odd
continue ? (press 4)
4
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
2
please type a number
15
its not power of two
continue ? (press 4)
5
invalid option
4
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
2
please type a number
32
its power of two
```



2M 2.1 _ M...
Version con...
Current File
Exercise6\...\Application.java
Exercise7\...\Main.java
ipAPP.java
Exercise6\...\Main.java
Run
Main
)N > Newer Richard > 2.1 _ Methods2-Solution > Exercise6 > src > Main > main
13:56 CRLF UTF-8 4 spaces

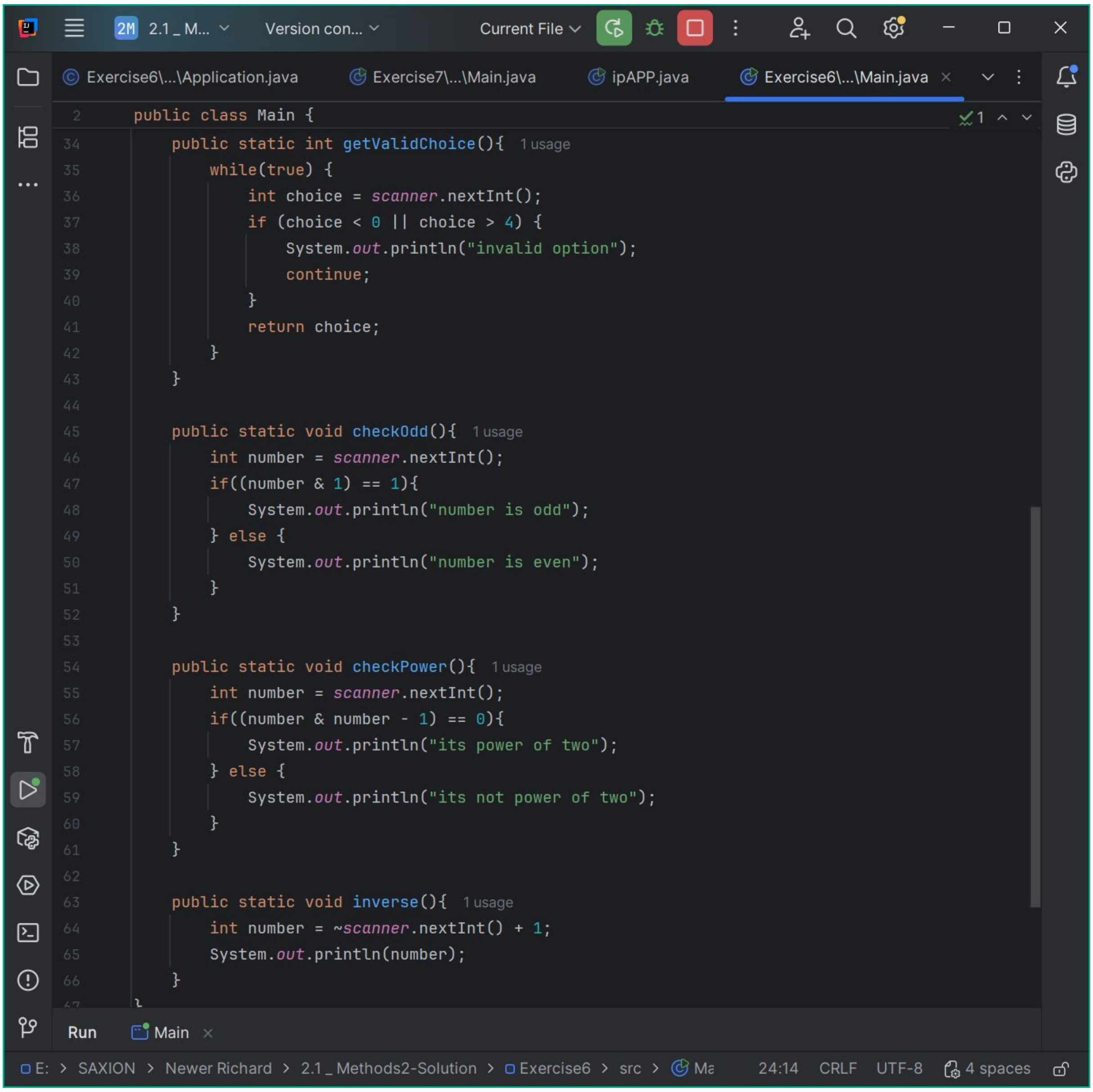
```
invalid option
4
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
2
please type a number
32
its power of two
continue ? (press 4)
4
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
1
please type a number
46
number is even
continue ? (press 4)
4
1. check if the numbere is odd
2. check if the number is power of two
3. Two compliments of the number
0 to Exit
3
please type a number
67
-67
continue ? (press 4)
```

SCREENSHOTS OF THE SOURCE CODE IN THE NEXT PAGES



```java
import java.util.Scanner;
public class Main {
    static Scanner scanner = new Scanner(System.in);
    public static void main(String[] args){
        printMenu();
        while(true) {
            int userInput = getValidChoice();
            if(userInput == 0){
                break;
            } else if(userInput == 1){
                System.out.println("please type a number");
                checkOdd();
                System.out.println("continue ? (press 4");
            }else if(userInput == 2){
                System.out.println("please type a number");
                checkPower();
                System.out.println("continue ? (press 4)");
            } else if(userInput == 3){
                System.out.println("please type a number");
                inverse();
                System.out.println("continue ? (press 4)");
            } else if(userInput == 4){
                printMenu();
            }
        }
    }
    public static void printMenu(){
        System.out.println("1. check if the numbere is odd");
        System.out.println("2. check if the number is power of two");
        System.out.println("3. Two compliments of the number");
        System.out.println("0 to Exit");
    }

    public static int getValidChoice(){
        while(true) {
```



2M 2.1 _ M...
Version con...
Current File
Exercise6\...\Application.java
Exercise7\...\Main.java
ipAPP.java
Exercise6\...\Main.java
Run
Main
E: > SAXION > Newer Richard > 2.1 _ Methods2-Solution > Exercise6 > src > Ma
24:14 CRLF UTF-8 4 spaces

```java
public class Main {
    public static int getValidChoice(){  1 usage
        while(true) {
            int choice = scanner.nextInt();
            if (choice < 0 || choice > 4) {
                System.out.println("invalid option");
                continue;
            }
            return choice;
        }
    }

    public static void checkOdd(){  1 usage
        int number = scanner.nextInt();
        if((number & 1) == 1){
            System.out.println("number is odd");
        } else {
            System.out.println("number is even");
        }
    }

    public static void checkPower(){  1 usage
        int number = scanner.nextInt();
        if((number & number - 1) == 0){
            System.out.println("its power of two");
        } else {
            System.out.println("its not power of two");
        }
    }

    public static void inverse(){  1 usage
        int number = ~scanner.nextInt() + 1;
        System.out.println(number);
    }
}
```

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