Template Week 2 – Logic

Student number:

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
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?

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

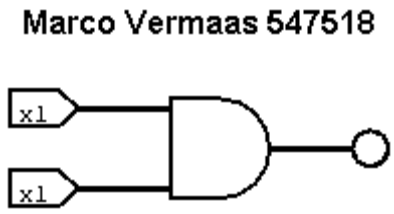
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

It's a XOR gate

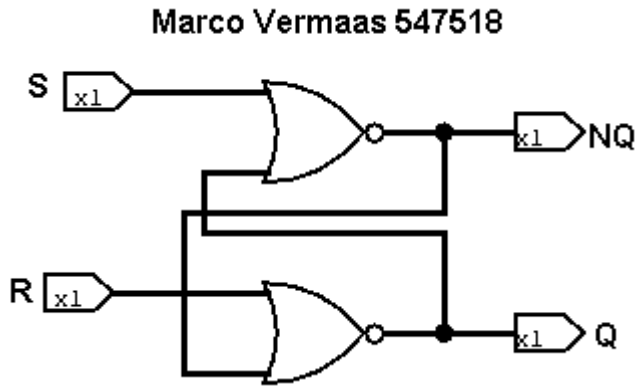
Assignment 2.4: Getting to know Logisim evolution

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



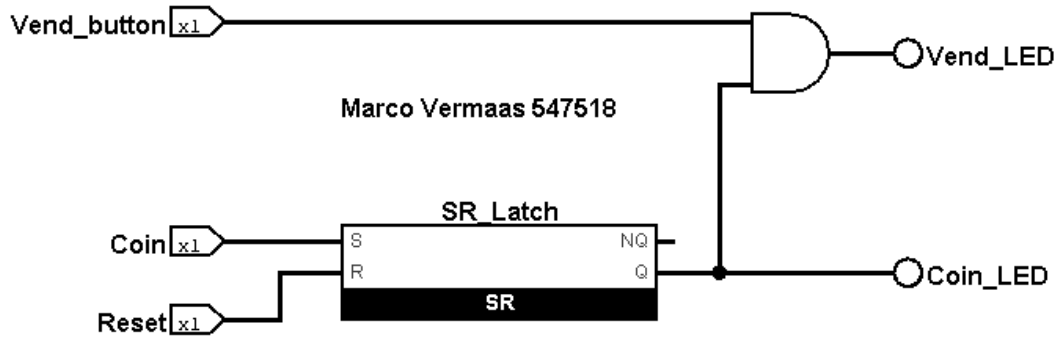
Assignment 2.5: SR Latch

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

2#

```
public class test {

   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 + " is NOT 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 = 7;

      if ((userPermissions & READ) != 0) {
         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 = 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 test {
   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.

```
import java.util.Scanner;

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

      System.out.print("Enter a number: ");
      number = scanner.nextInt();

      int choice;
      do {
         System.out.println("\n--- Menu ---");
         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?");
         System.out.println("4. Exit");
         System.out.print("Choose an option: ");
         choice = scanner.nextInt();

         switch (choice) {
            case 1:
               if ((number & 1) == 1) {
```

```
                System.out.println(number + " is odd");
            } else {
                System.out.println(number + " is even");
            }
            break;

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

        case 3:
            System.out.println("Two's complement of " + number + " is: " + (number = ~number + 1));
            break;

        case 4:
            System.out.println("Exiting...");
            break;

        default:
            System.out.println("Invalid choice. Try again.");
            break;
      }

    } while (choice != 4);

    scanner.close();
  }
}
```

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