CODE:

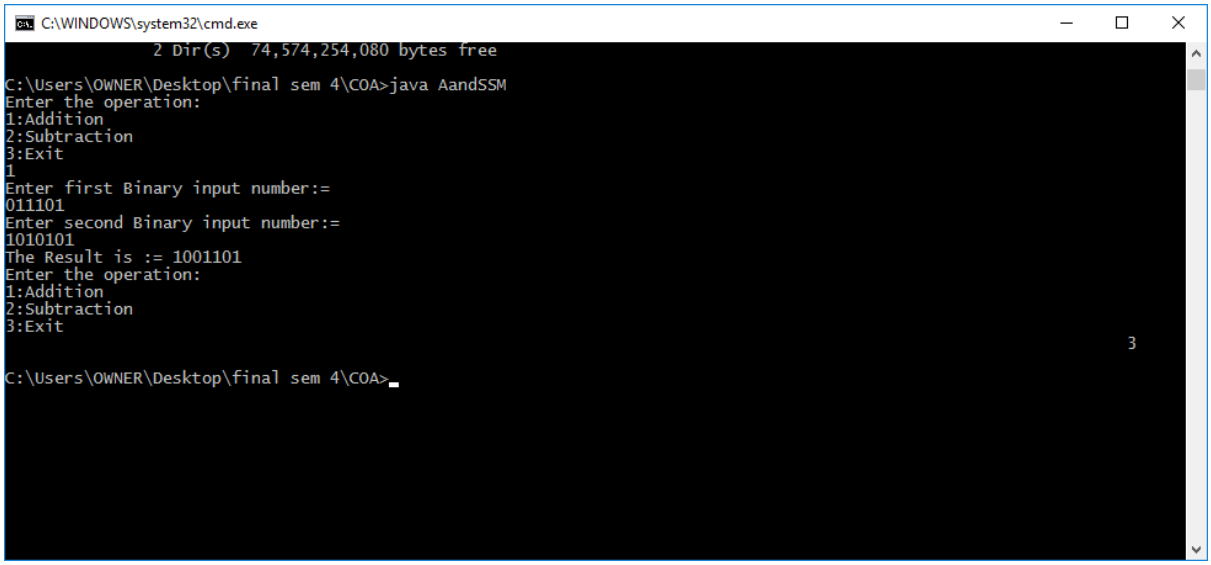
```
import java.util.*;
import java.io.*;
class AandSSM{
      public static String add(String a,String b){
            int l1=a.length();
            int l2=b.length(),cd;
            String o=new String();
            StringBuilder sb=new StringBuilder();
            cd=(l1>l2)?l1-l2:l2-l1;
            if(cd!=0){
            String n=(l1>l2)?b:a;
            sb.append(n.charAt(0));
            for(int i=0;i<cd;i++){
                  sb.append('0');
            }
            for(int i=0;i<n.length()-1;i++){
                  sb.append(n.charAt(i+1));
            }
            if(l1>l2)
                  b=sb.toString();
            else
                  a=sb.toString();
            }
            sb=new StringBuilder();
            char c='0';
            char s='0',d;
            System.out.println(a.length());
            for(int i=a.length()-1;i>0;i--){
                  d='0';
                  if(a.charAt(i)=='0' && b.charAt(i)=='0')
                        s='0';
                  else if(a.charAt(i)=='0' && b.charAt(i)=='1')
                        s='1';
                  else if(a.charAt(i)=='1' && b.charAt(i)=='0')
                        s='1';
                  else if(a.charAt(i)=='1' && b.charAt(i)=='1'){
                        s='0';
                        d='1';
                  }
                  if(s=='0' && c=='0');
                  else if(s=='1' && c=='0');
                  else if(s=='0' && c=='1')
                        s='1';
                  else if(s=='1' && c=='1'){
                        d='1';
                        s='0';
                  }
                  c=d;
                  sb.append(s);
            }
            if(c=='1')
                  sb.append('1');
            sb.append(a.charAt(0));
            sb=sb.reverse();
            o=sb.toString();
            return o;
      }
      public static String sub(String a,String b){
            int l1=a.length();
            int l2=b.length(),cd;
```

```
        String o=new String();
        StringBuilder sb=new StringBuilder();
        cd=(l1>l2)?l1-l2:l2-l1;
        if(cd!=0){
        String n=(l1>l2)?b:a;
        sb.append(n.charAt(0));
        for(int i=0;i<cd;i++){
              sb.append('0');
        }
        for(int i=0;i<n.length()-1;i++){
              sb.append(n.charAt(i+1));
        }
        if(l1>l2)
              b=sb.toString();
        else
              a=sb.toString();
        }
        sb=new StringBuilder();
        char c='0';
        char s='0',d;
        for(int i=a.length()-1;i>0;i--){
              d='0';
              if(a.charAt(i)=='0' && b.charAt(i)=='0')
                    s='0';
              else if(a.charAt(i)=='1' && b.charAt(i)=='1')
                    s='0';
              else if(a.charAt(i)=='1' && b.charAt(i)=='0')
                    s='1';
              else if(a.charAt(i)=='0' && b.charAt(i)=='1'){
                    s='1';
                    d='1';
              }
              if(s=='0' && c=='0');
              else if(s=='1' && c=='0');
              else if(s=='1' && c=='1')
                    s='0';
              else if(s=='0' && c=='1'){
                    d='1';
                    s='1';
              }
              c=d;
              sb.append(s);
        }
        if(c=='1'){
              o=sub(b,a);
              sb=new StringBuilder();
              sb.append((a.charAt(0)=='0')?'1':'0');
              for(int i=1;i<o.length();i++){
                    sb.append(o.charAt(i));
              }
        }
        else{
              sb.append(a.charAt(0));
              sb=sb.reverse();
        }
        o=sb.toString();
        return o;
  }
  public static boolean check(String a){
        for(int i=0;i<a.length();i++){
              int c=a.charAt(i)-'0';
              if(!(c>=0&&c<2))
```

```
                        return false;
                }
                return true;
        }
        public static void main(String args[]){
                Scanner sc =new Scanner(System.in);
                boolean k=true;
                String i1,i2;
                StringBuilder sb;
                int i=3;
                while(k){
                System.out.println("Enter the
operation:\n1:Addition\n2:Subtraction\n3:Exit");
                i=3;
                i=sc.nextInt();
                switch(i){
                        case 1:
                        sb=new StringBuilder();
                        System.out.println("Enter first Binary input
number:=");
                        i1=sc.next();
                        if(!check(i1)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        System.out.println("Enter second Binary input
number:=");
                        i2=sc.next();
                        if(!check(i2)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        if(i1.charAt(0)==i2.charAt(0)){
                                String Out =add(i1,i2);
                                System.out.println("The Result is := "+Out);
                        }
                        else{
                                sb.append((i2.charAt(0)=='0')?'1':'0');
                                for(i=i2.length()-1;i>0;i--){
                                        sb.append(i2.charAt(i));
                                }
                                sb=sb.reverse();
                                String Out =sub(i1,sb.toString());
                                System.out.println("The Result is := "+Out);
                        }
                        break;
                        case 2:
                        sb=new StringBuilder();
                        System.out.println("Enter first Binary input
number:=");
                        i1=sc.next();
                        if(!check(i1)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        System.out.println("Enter second Binary input
number:=");
                        i2=sc.next();
                        if(!check(i2)){
                                System.out.println("Wrong Input....");
                                break;
                        }
```

```
                    if(i1.charAt(0)==i2.charAt(0)){
                          String Out =sub(i1,i2);
                          System.out.println("The Result is := "+Out);
                    }
                    else{
                          for(i=i2.length()-1;i>0;i--){
                                sb.append(i2.charAt(i));
                          }
                          sb.append((i2.charAt(0)=='0')?'1':'0');
                          sb=sb.reverse();
                          String Out =add(i1,sb.toString());
                          System.out.println("The Result is := "+Out);
                    }
                    break;
                    case 3:
                    k=false;
                    break;
                    default:
                    System.out.println("Wrong Input.....");
              }
        }
        }
}
```

OUTPUT:



CODE:

```
import java.util.*;
import java.io.*;
class AandSSM{
	public static String add(String a,String b){
		int l1=a.length();
		int l2=b.length(),cd;
		String o=new String();
		StringBuilder sb=new StringBuilder();
		cd=(l1>l2)?l1-l2:l2-l1;
		if(cd!=0){
		String n=(l1>l2)?b:a;
		sb.append(n.charAt(0));
		for(int i=0;i<cd;i++){
			sb.append('0');
		}
		for(int i=0;i<n.length()-1;i++){
			sb.append(n.charAt(i+1));
		}
		if(l1>l2)
			b=sb.toString();
		else
			a=sb.toString();
		}
		sb=new StringBuilder();
		char c='0';
		char s='0',d;
		System.out.println(a.length());
		for(int i=a.length()-1;i>0;i--){
			d='0';
			if(a.charAt(i)=='0' && b.charAt(i)=='0')
				s='0';
			else if(a.charAt(i)=='0' && b.charAt(i)=='1')
				s='1';
			else if(a.charAt(i)=='1' && b.charAt(i)=='0')
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			else if(a.charAt(i)=='1' && b.charAt(i)=='1'){
				s='0';
				d='1';
			}
			if(s=='0' && c=='0');
			else if(s=='1' && c=='0');
			else if(s=='0' && c=='1')
				s='1';
			else if(s=='1' && c=='1'){
				d='1';
				s='0';
			}
			c=d;
			sb.append(s);
		}
		if(c=='1')
			sb.append('1');
		sb.append(a.charAt(0));
		sb=sb.reverse();
		o=sb.toString();
		return o;
	}
	public static String sub(String a,String b){
		int l1=a.length();
		int l2=b.length(),cd;
```

```
        String o=new String();
        StringBuilder sb=new StringBuilder();
        cd=(l1>l2)?l1-l2:l2-l1;
        if(cd!=0){
        String n=(l1>l2)?b:a;
        sb.append(n.charAt(0));
        for(int i=0;i<cd;i++){
              sb.append('0');
        }
        for(int i=0;i<n.length()-1;i++){
              sb.append(n.charAt(i+1));
        }
        if(l1>l2)
              b=sb.toString();
        else
              a=sb.toString();
        }
        sb=new StringBuilder();
        char c='0';
        char s='0',d;
        for(int i=a.length()-1;i>0;i--){
              d='0';
              if(a.charAt(i)=='0' && b.charAt(i)=='0')
                    s='0';
              else if(a.charAt(i)=='1' && b.charAt(i)=='1')
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              else if(a.charAt(i)=='1' && b.charAt(i)=='0')
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              else if(a.charAt(i)=='0' && b.charAt(i)=='1'){
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              if(s=='0' && c=='0');
              else if(s=='1' && c=='0');
              else if(s=='1' && c=='1')
                    s='0';
              else if(s=='0' && c=='1'){
                    d='1';
                    s='1';
              }
              c=d;
              sb.append(s);
        }
        if(c=='1'){
              o=sub(b,a);
              sb=new StringBuilder();
              sb.append((a.charAt(0)=='0')?'1':'0');
              for(int i=1;i<o.length();i++){
                    sb.append(o.charAt(i));
              }
        }
        else{
              sb.append(a.charAt(0));
              sb=sb.reverse();
        }
        o=sb.toString();
        return o;
  }
  public static boolean check(String a){
        for(int i=0;i<a.length();i++){
              int c=a.charAt(i)-'0';
              if(!(c>=0&&c<2))
```

```
                        return false;
                }
                return true;
        }
        public static void main(String args[]){
                Scanner sc =new Scanner(System.in);
                boolean k=true;
                String i1,i2;
                StringBuilder sb;
                int i=3;
                while(k){
                System.out.println("Enter the
operation:\n1:Addition\n2:Subtraction\n3:Exit");
                i=3;
                i=sc.nextInt();
                switch(i){
                        case 1:
                        sb=new StringBuilder();
                        System.out.println("Enter first Binary input
number:=");
                        i1=sc.next();
                        if(!check(i1)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        System.out.println("Enter second Binary input
number:=");
                        i2=sc.next();
                        if(!check(i2)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        if(i1.charAt(0)==i2.charAt(0)){
                                String Out =add(i1,i2);
                                System.out.println("The Result is := "+Out);
                        }
                        else{
                                sb.append((i2.charAt(0)=='0')?'1':'0');
                                for(i=i2.length()-1;i>0;i--){
                                        sb.append(i2.charAt(i));
                                }
                                sb=sb.reverse();
                                String Out =sub(i1,sb.toString());
                                System.out.println("The Result is := "+Out);
                        }
                        break;
                        case 2:
                        sb=new StringBuilder();
                        System.out.println("Enter first Binary input
number:=");
                        i1=sc.next();
                        if(!check(i1)){
                                System.out.println("Wrong Input....");
                                break;
                        }
                        System.out.println("Enter second Binary input
number:=");
                        i2=sc.next();
                        if(!check(i2)){
                                System.out.println("Wrong Input....");
                                break;
                        }
```

```
                    if(i1.charAt(0)==i2.charAt(0)){
                          String Out =sub(i1,i2);
                          System.out.println("The Result is := "+Out);
                    }
                    else{
                          for(i=i2.length()-1;i>0;i--){
                                sb.append(i2.charAt(i));
                          }
                          sb.append((i2.charAt(0)=='0')?'1':'0');
                          sb=sb.reverse();
                          String Out =add(i1,sb.toString());
                          System.out.println("The Result is := "+Out);
                    }
                    break;
                    case 3:
                    k=false;
                    break;
                    default:
                    System.out.println("Wrong Input.....");
              }
        }
        }
}
```

OUTPUT: