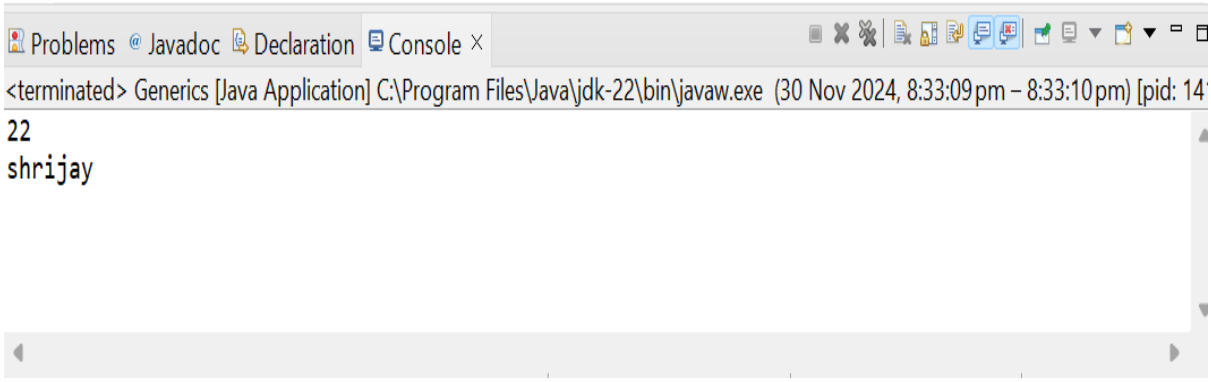
Java Generics

Problem Statement 1 : Write a Java Program to demonstrate a Generic Class.

Code :

```
package com.shree;
class shree<T>{
	T obj;
	shree(T obj){
		this.obj = obj;
	}
	public T getObj() {
		return this.obj;
	}
}
public class Generics {
	public static void main(String[] args) {
		shree<Integer> obj1 = new shree<>(22);
		System.out.println(obj1.getObj());
		shree<String> obj2 = new shree<>("shrijay");
		System.out.println(obj2.getObj());
	}
}
```

Output :

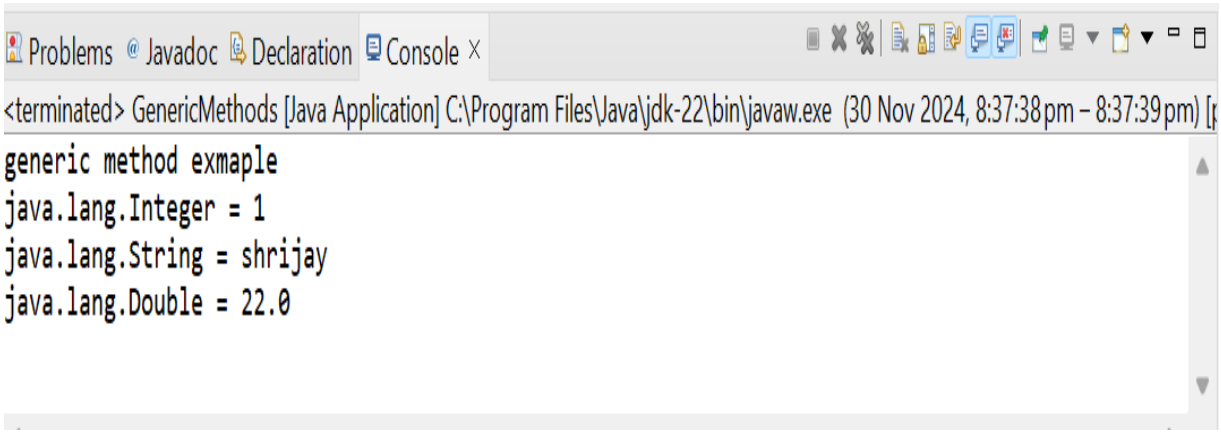


Problem Statement 2 : Write a Java Program to demonstrate Generic Methods.

Code :

```
package com.shree;
public class GenericMethods {
        static void display()
        {
        System.out.println("generic method exmaple");
        }
        static <T> void gdisplay (T e)
        {
        System.out.println(e.getClass().getName() + " = " + e);
        }
        public static void main(String[] args) {
                display();
                gdisplay(1);
                gdisplay("shrijay");
                gdisplay(22.0);
        }
}
```

Output :



Problem Statement 3 : Write a Java Program to demonstrate Wildcards in Java Generics.

Code :

```
package com.shree;
import java.util.*;
public class wildcards {
        private static double sum(List<? extends Number> list) {
        double sum = 0.0;
        for (Number i : list) {
        sum = sum + i.doubleValue();
        }
        return sum;
        }
        private static void show(List<? super Integer> list) {
        list.forEach((x) -> {
        System.out.print(x + " ");
        });
        }
       private static void print(List<?> list) {
                for(Object obj : list) {
                        System.out.print(obj + " ");
                }System.out.println();
       }
       public static void main(String[] args) {
                System.out.println("Upper Bounded : ");
                 List<Integer> list1 = Arrays.asList(4, 2, 7, 5, 1, 9);
                 System.out.println("List 1 Sum : " + sum(list1));
                 List<Double> list2 = Arrays.asList(4.7, 2.4, 7.3, 5.4, 1.5, 9.2);
                 System.out.println("List 2 Sum : " + sum(list2));
                 System.out.println("\nLower Bounded : ");
```

```
        List<Integer> list3 = Arrays.asList(4, 2, 7, 5, 1, 9);
        System.out.println("Only Classes With Integer Superclass will be Accepted :");
        show(list3);
        print(list1);
    }
}
```

Output :

```
Problems  Javadoc  Declaration  Console ×
<terminated> wildcards [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 8:43:35 pm – 8:43:40 pm) [pid: 213
Upper Bounded :
List 1 Sum : 28.0
List 2 Sum : 30.499999999999996

Lower Bounded :
Only Classes With Integer Superclass will be Accepted :
4 2 7 5 1 9 4 2 7 5 1 9
```

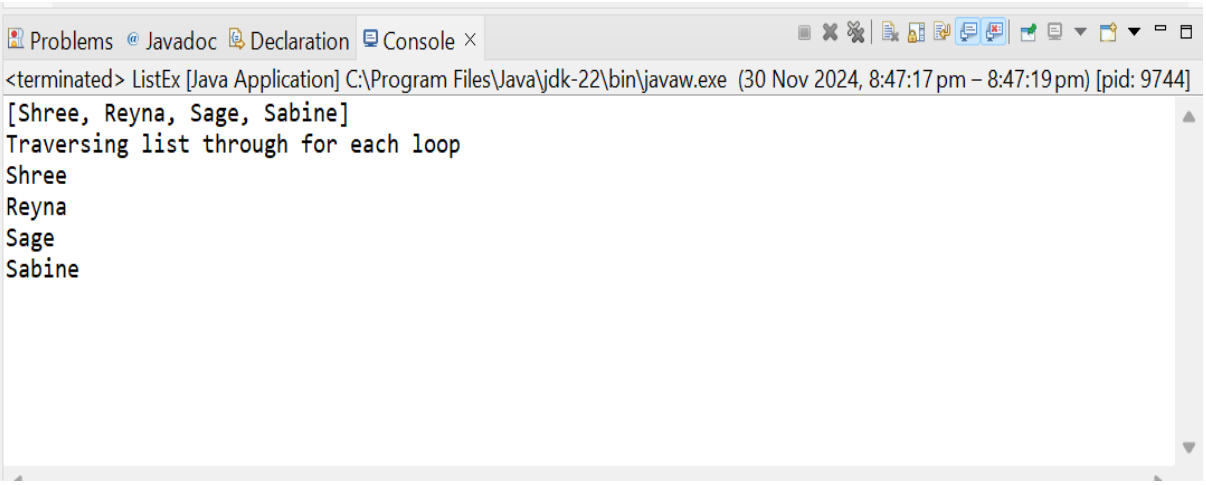
List Interface

Problem Statement 1 : Write a Java program to create List containing list of items of type String and use for- --each loop to print the items of the list.

Code :

```
package com.shree;

import java.util.*;

public class ListEx {

	public static void main(String[] args) {

		ArrayList<String>list=new ArrayList<String>();

		list.add("Shree");

		list.add("Reyna");

		list.add("Sage");

		list.add("Sabine");

		System.out.println(list);

		System.out.println("Traversing list through for each loop");

		for(String subject:list)

		System.out.println(subject);

	}

}
```

Output :



Problem Statement 2 : Write a Java program to create List containing list of items and use ListIterator interface to print items present in the list. Also print the list in reverse/ backward direction.

Code :

```
package com.shree;

import java.util.*;

public class ListEx {

	public static void main(String[] args) {

		List<String> mylist = new ArrayList<String>();

		mylist.add("Shree");

		mylist.add("Reyna");

		mylist.add("Sage");

		mylist.add("Sabine");

		mylist.add("Klara");

		System.out.println("Traversing through iterator");

		System.out.println("Original List:");

		Iterator itr=mylist.iterator();

		while(itr.hasNext()) {

		System.out.println(itr.next());

		}

		Collections.reverse(mylist);

		System.out.println();

		System.out.println("Reversed List:");

		Iterator itr1=mylist.iterator();

		while(itr1.hasNext()) {

		System.out.println(itr1.next());

		}

	}

}
```

Output :

```
Problems  Javadoc  Declaration  Console ×
<terminated> ListEx [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 8:50:37 pm – 8:50:38 pm) [pid: 3276]
Traversing through iterator
Original List:
Shree
Reyna
Sage
Sabine
Klara

Reversed List:
Klara
Sabine
Sage
Reyna
Shree
```

Set Interface

Problem Statement 1 : Write a Java program to create a Set containing list of items of type Stringandprint the items in the list using Iterator interface. Also print the list in reverse/ backword direction.

Code :

```
package com.shree;

import java.util.*;

public class SetEx {

	public static void main(String[] args) {

		List<String> mylist = new ArrayList<String>();

		mylist.add("Shree");

		mylist.add("Reyna");

		mylist.add("Sage");

		mylist.add("Sabine");

		System.out.println("Original list ");

		Iterator<String> itr=mylist.iterator();

		while(itr.hasNext()){

		System.out.println(itr.next());

		}

		Collections.reverse(mylist);

		System.out.println(" ");

		System.out.println("reversed list ");

		Iterator<String> itr1=mylist.iterator();

		while(itr1.hasNext()){

		System.out.println(itr1.next());

	}

}

}
```

Output :

```
Problems  Javadoc  Declaration  Console ×
<terminated> SetEx [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 9:25:26 pm – 9:25:27 pm) [pid: 10020
Original list
Shree
Reyna
Sage
Sabine

reversed list
Sabine
Sage
Reyna
Shree
```

Problem Statement 2 : Write a Java program using Set interface containing list of items and perform the following operations :

a. Add items in the set.

b. Insert items of one set in to other set.

c. Remove items from the set .

d. Search the specified item in the set.

Code :

```
package com.shree;

import java.util.*;

public class SetEx {

	public static void main(String[] args) {

		Set<Integer> s = new LinkedHashSet<Integer>();

		s.add(69);

		s.add(57);

		s.add(10);

		s.add(18);

		s.add(90);

		s.add(151);

		Set<Integer> s1 = new LinkedHashSet<Integer>();

		s1.add(70);

		s1.add(35);

		s.addAll(s1);

		System.out.println("Set1: " + s);

		System.out.println("Set2: " + s1);

		System.out.println();

		System.out.println("After Adding set2 into set1: " + s);

		s.remove(10);

		s.remove(18);

		System.out.println("Set after removing elements: " + s);

		System.out.println();
```

```
        System.out.println("Does the Set contains: 57? "+ s.contains(57));
        System.out.println("Does the Set contains: 18? " + s.contains(18));
    }
}
```

Output :

```
Problems  Javadoc  Declaration  Console ×
<terminated> SetEx [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 9:29:17 pm – 9:29:17 pm) [pid: 9256]
Set1: [69, 57, 10, 18, 90, 151, 70, 35]
Set2: [70, 35]

After Adding set2 into set1: [69, 57, 10, 18, 90, 151, 70, 35]
Set after removing elements: [69, 57, 90, 151, 70, 35]

Does the Set contains: 57? true
Does the Set contains: 18? false
```

Map Interface

Problem Statement 1 : Write a Java program using Map interface containing list of items having keys and associatedvaluesand perform the following operations :

a. Add items in the map.

b. Remove items from the map.

c. Search specific key from the map.

d. Get value of the specified key.

e. Insert map elements of one map in to other map.

f. Print all keys and values of the map.

Code :

```
package com.shree;

import java.util.*;

public class MapEx {

	public static void main(String[] args) {

		Map<Integer, String> map = new HashMap<>();

		map.put(1 ,"Shree");

		map.put(2,"Sage");

		map.put(3,"Reyna");

		map.put(4,"Sabine");

		map.put(5,"Klara");

		System.out.println();

		Map<Integer, String> map1 = new HashMap<>();

		map1.put(6 ,"Amir");

		map1.put(7,"Raze");

		map1.put(8,"yassine");

		System.out.println("Map 1");

		for (Map.Entry<Integer, String> e : map1.entrySet())

			System.out.println(e.getKey() + " " + e.getValue());

		System.out.println();
```

```
        System.out.println("Map 2");
        for (Map.Entry<Integer, String> e : map1.entrySet())
        System.out.println(e.getKey() + " " + e.getValue());
        System.out.println("Insert map into another map");
        Map<Integer, String> map2 = new HashMap<>();
        map2.putAll(map);
        map2.putAll(map1);
        System.out.println(map2);
        System.out.println();
        System.out.println("Remove items from the map");
        map.remove((3));
        for (Map.Entry<Integer, String> e : map.entrySet())
        System.out.println(e.getKey() + " "+ e.getValue());
        System.out.println();
        System.out.println();
        System.out.println("Search specific key from the map");
        System.out.println("Is the key '2' present? " +
        map.containsKey(2));
        System.out.println("Is the key '6' present? " +
        map.containsKey(6));
        System.out.println();
        System.out.println("Get value of the specified key");
        String val = (String)map.get(2);
        System.out.println(val);
        System.out.println();
    }
}
```

Output :

```
Problems  Javadoc  Declaration  Console ×
<terminated> MapEx [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 9:34:53 pm – 9:34:53 pm) [pid: 7952]

Map 1
6 Amir
7 Raze
8 yassine

Map 2
6 Amir
7 Raze
8 yassine
Insert map into another map
{1=Shree, 2=Sage, 3=Reyna, 4=Sabine, 5=Klara, 6=Amir, 7=Raze, 8=yassine}

Remove items from the map
1 Shree
2 Sage
4 Sabine
5 Klara


Search specific key from the map
Is the key '2' present? true
Is the key '6' present? false

Get value of the specified key
Sage
```

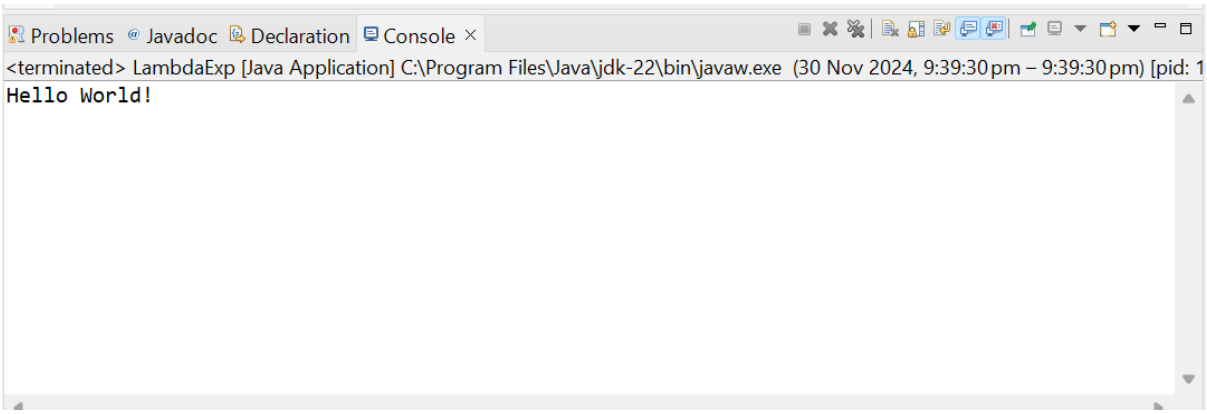
Lambda Expressions

Problem Statement 1 : Write a Java program using Lambda Expression to print “Hello World!”.

Code :

```
package com.shree;

interface HelloWorld {

 String sayHello(String name);

}

public class LambdaExp {

	public static void main(String[] args) {

		HelloWorld helloWorld = (String name) -> { return "Hello " + name; };

		System.out.println(helloWorld.sayHello("World!"));

	}

}
```

Output :



Problem Statement 2 : Write a Java program using Lambda Expression with single parameter.

Code :

```
package com.shree;

interface Say{

  public String say(String name);

}

public class LambdaExp {

        public static void main(String[] args) {

                Say s1=(name)->{return "Hello "+name;};

           System.out.println(s1.say("shrijay"));

        }

}
```

Output :

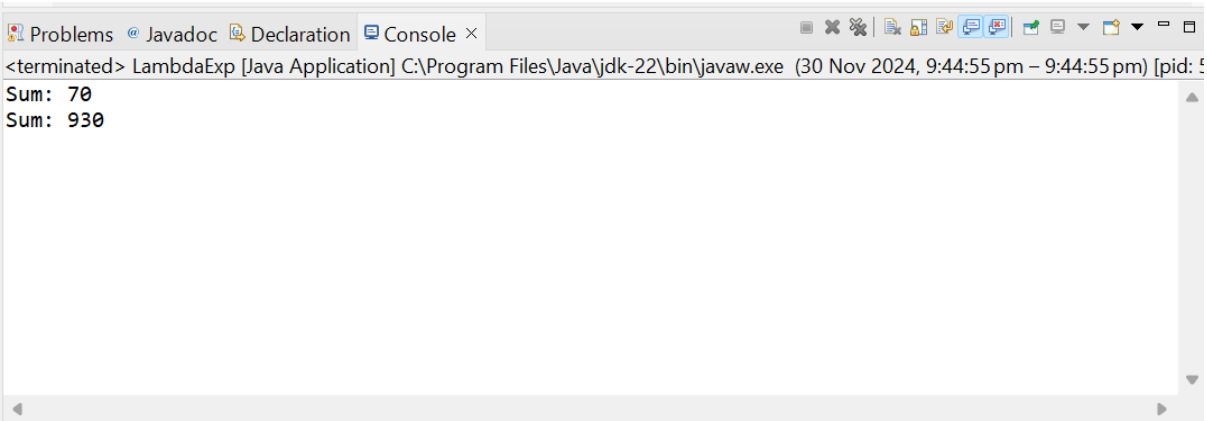
```
Problems  Javadoc  Declaration  Console ×
<terminated> LambdaExp [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (30 Nov 2024, 9:42:51 pm – 9:42:51 pm) [pid: 1
Hello shrijay
```

Problem Statement 3 : Write a Java program using Lambda Expression with multiple parameters to add two numbers.

Code :

```
package com.shree;

interface Add {

	int add(int a,int b);

}

public class LambdaExp {

	public static void main(String[] args) {

		Add ad1=(a,b)->(a+b);

		System.out.println("Sum: " +ad1.add(50,20));

		Add ad2=(int a,int b)->(a+b);

		System.out.println("Sum: " +ad2.add(700,230));

	}

}
```

Output :



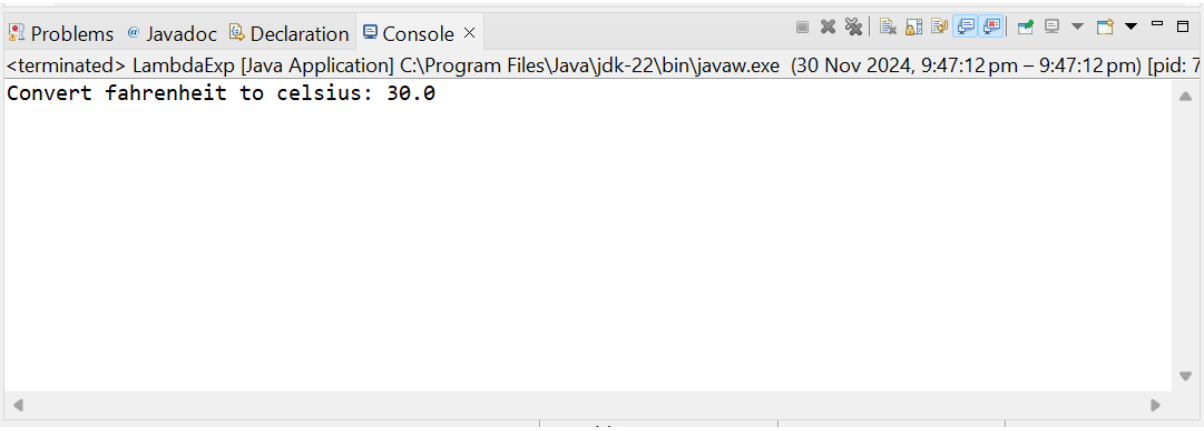
Problem Statement 4 : Write a Java program using Lambda Expression to calculate the following:

a. Convert Fahrenheit to Celsius

Code :

```
package com.shree;

interface temp {

  public double convert(double temp);

}

public class LambdaExp {

        public static void main(String[] args) {

                temp t1=(double a)->{return((a-32)* 5/9);};

                System.out.print("Convert fahrenheit to celsius: "+ t1.convert(86));

        }

}
```

Output :



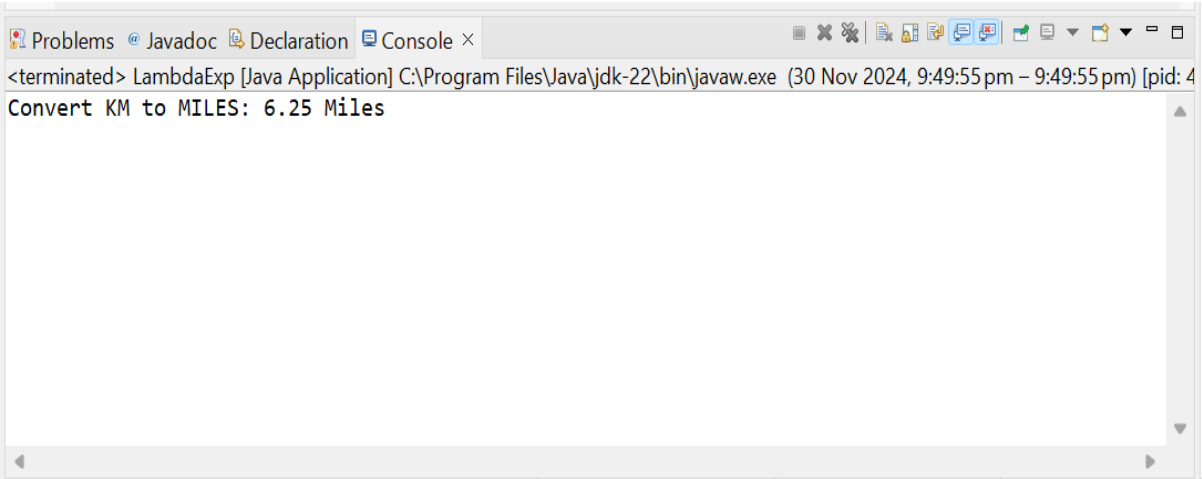
b. Convert Kilometers to Miles.

Code :

```
package com.shree;

interface KmToMiles{

  public double convert(double temp);

}
```

```
public class LambdaExp {
	public static void main(String[] args) {
		KmToMiles kmt=(double a)->{return(a/1.6);};
		System.out.print("Convert KM to MILES: "+ kmt.convert(10)+ " Miles");


	}
}
```

Output :

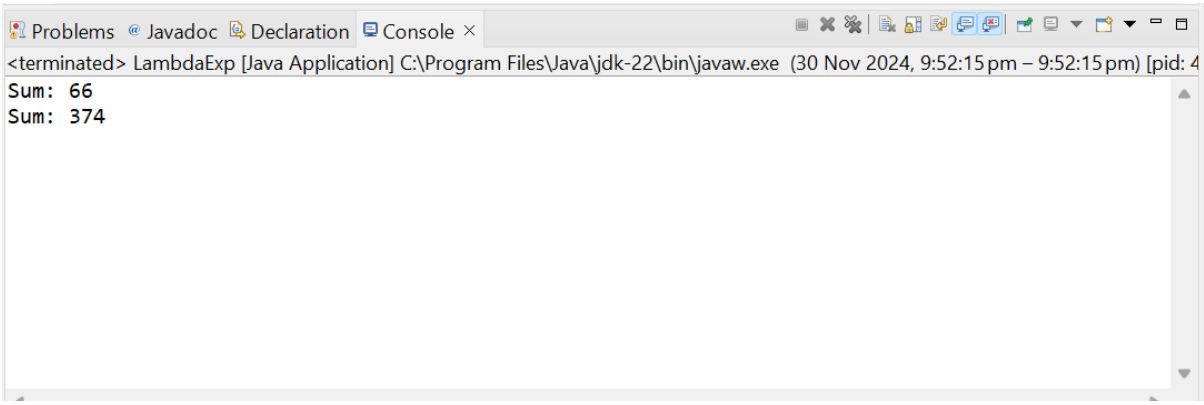


Problem Statement 5 : Write a Java program using Lambda Expression with or without return keyword.

Code :

```
package com.shree;

interface Add2{

  int add(int a,int b);

}

public class LambdaExp {

        public static void main(String[] args) {

                // without return keyword

                Add2 ad1=(a,b)->(a+b);

                System.out.println("Sum: " +ad1.add(43,23));


                // with return keyword

                Add2 ad2=(int a,int b)->{return (a+b);};

                System.out.println("Sum: " +ad2.add(54,320));

        }

}
```

Output :



Problem Statement 6 : Write a Java program using Lambda Expression to concatenate two strings.

Code :

```
package com.shree;

interface conc{

  public String concat(String a,String b);

}

public class LambdaExp {

        public static void main(String[] args) {

                conc s1 = (String a,String b)->{return (a+b);};

                System.out.println(s1.concat("Hello"," Sage"));

        }

}
```

Output :