

Q1. Create a functional Interface **Greeting** with the method **greet()**. Return “**Hello Everyone**” and “**Good Morning**” in the console using lambda expressions.

```
public class GreetingsExample {  
  
    interface Greeting {  
        String greet();  
    }  
  
    public static void main(String[] args) {  
        // Lambda expression for saying hello  
        Greeting hello = () -> {  
            return "Hello, world!";  
        };  
  
        // Lambda expression for saying good morning  
        Greeting morning = () -> {  
            return "Good morning!";  
        };  
  
        System.out.println(hello.greet());  
        System.out.println(morning.greet());  
    }  
}
```

Q2. Describe how lambda expressions are utilized within the program, and outline the purpose of the **RandomNumber** functional interface. Additionally, clarify how the program generates a random number within the specified range.

```
import java.util.Random;

public class RandomNumberGenerator {

    interface RandomNumber {
        int generate();
    }

    public static void main(String[] args) {
        // Lambda expression for generating a random number
        RandomNumber randomNumber = () -> {
            Random random = new Random();
            return random.nextInt(100);
        };

        System.out.println("Random number: " + randomNumber.generate());
    }
}
```

Q3. Describe the purpose of the **StringLengthCounter** class and the **StringProcessor** functional interface. Outline how the lambda expression **countLength** is used to count the length of different strings, and provide examples of the output produced by the program.

```
public class StringLengthCounter {

    interface StringProcessor {
        int process(String str);
    }

    public static void main(String[] args) {
        StringProcessor countLength = str -> str.length();

        System.out.println("Length of 'Hello': " + countLength.process("Hello"));
        System.out.println("Length of 'Lambda': " + countLength.process("Lambda"));
        System.out.println("Length of 'Expression': " + countLength.process("Expression"));
    }
}
```

Q4. Describe the purpose of the **NumberSquarer** class and the **Function** functional interface. Outline how the lambda expression **square** is used to square different numbers, and provide examples of the output produced by the program.

```
import java.util.function.Function;

public class NumberSquarer {

    public static void main(String[] args) {
        Function<Integer, Integer> square = num -> num * num;

        System.out.println("Square of 5: " + square.apply(5));
        System.out.println("Square of 8: " + square.apply(8));
        System.out.println("Square of 10: " + square.apply(10));
    }
}
```

Q5. Describe the purpose of the **EvenNumberChecker** class and the **Predicate** functional interface. Outline how the lambda expression **isEven** is used to check if different numbers are even, and provide examples of the output produced by the program.

```
import java.util.function.Predicate;

public class EvenNumberChecker {

    public static void main(String[] args) {
        Predicate<Integer> isEven = num -> num % 2 == 0;

        System.out.println("Is 4 even? " + isEven.test(4));
        System.out.println("Is 7 even? " + isEven.test(7));
        System.out.println("Is 10 even? " + isEven.test(10));
    }
}
```

Q6. Describe the purpose of the **ListElementPrinter** class and the **Consumer** functional interface. Outline how the lambda expression **printElement** is used to print each element of a list, and provide examples of the output produced by the program.

```
import java.util.Arrays;
import java.util.List;
import java.util.function.Consumer;

public class ListElementPrinter {

    public static void main(String[] args) {
        List<String> fruits = Arrays.asList("Apple", "Banana", "Orange");

        Consumer<String> printElement = item -> System.out.println(item);

        fruits.forEach(printElement);
    }
}
```

Q7. Create a functional interface named **Calculator** with a method **operate(int num1, int num2)** that takes two integer parameters and performs an arithmetic operation. Implement this interface using lambda expressions to define **addition, subtraction, multiplication, and division** operations.

```
// Functional interface Calculator
interface Calculator {
    int operate(int num1, int num2);
}

public class CalculatorImplementation {
    public static void main(String[] args) {
        // Lambda expressions for addition, subtraction, multiplication, and division operations
        Calculator addition = (num1, num2) -> num1 + num2;
        Calculator subtraction = (num1, num2) -> num1 - num2;
        Calculator multiplication = (num1, num2) -> num1 * num2;
        Calculator division = (num1, num2) -> {
            if (num2 != 0) {
                return num1 / num2;
            } else {
                throw new IllegalArgumentException("Cannot divide by zero");
            }
        };

        // Test the operations
        int a = 10, b = 5;
        System.out.println("Addition: " + addition.operate(a, b));
        System.out.println("Subtraction: " + subtraction.operate(a, b));
        System.out.println("Multiplication: " + multiplication.operate(a, b));
        System.out.println("Division: " + division.operate(a, b));
    }
}
```

Q8. Write a Java program that processes a list of strings. Define a functional interface **StringProcessor** with a method **process(String str1, String str2)** that concatenates two strings and returns the result. Use lambda expressions to implement this interface and process each pair of strings from the list.

```
import java.util.ArrayList;
import java.util.List;

// Functional interface StringProcessor
interface StringProcessor {
    String process(String str1, String str2);
}

public class StringProcessorExample {
    public static void main(String[] args) {
        // Sample list of strings
        List<String> strings = new ArrayList<>();
        strings.add("Hello");
        strings.add("World");
        strings.add("Java");
        strings.add("Programming");

        // Lambda expression to concatenate two strings
        StringProcessor concatenator = (str1, str2) -> str1 + str2;

        // Process each pair of strings from the list
        for (int i = 0; i < strings.size() - 1; i++) {
            String processedString = concatenator.process(strings.get(i), strings.get(i + 1));
            System.out.println("Processed string: " + processedString);
        }
    }
}
```

Q9. Write a Java program that takes an array of integers as input and uses lambda expressions and the **forEach** loop to filter out and print only the even numbers.

```
import java.util.Arrays;

public class EvenNumberFilter {
    public static void main(String[] args) {
        int[] numbers = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};

        System.out.print("Even Numbers: ");
        Arrays.stream(numbers)
            .forEach(n -> {
                if (n % 2 == 0) {
                    System.out.print(n + " ");
                }
            });
    }
}
```

Q10. Write a Java program that takes a list of strings as input and uses lambda expressions and the **forEach** loop to filter out and print only the strings with a length greater than 5.

```
import java.util.ArrayList;
import java.util.List;

public class StringLengthFilter {
    public static void main(String[] args) {
        List<String> strings = new ArrayList<>();
        strings.add("apple");
        strings.add("banana");
        strings.add("orange");
        strings.add("kiwi");
        strings.add("pineapple");

        System.out.print("Strings with Length Greater Than 5: ");
        strings.forEach(str -> {
            if (str.length() > 5) {
                System.out.print(str + " ");
            }
        });
    }
}
```


11. Write a Java program that takes an array of strings as input and uses lambda expressions and the **forEach** loop to Filter out and print strings that start with a specific letter from a list of strings.

```
import java.util.ArrayList;
import java.util.List;

public class Main {
    public static void main(String[] args) {
        // Input list of strings
        List<String> strings = new ArrayList<>();
        strings.add("apple");
        strings.add("banana");
        strings.add("orange");
        strings.add("grape");

        // Specific letter to filter strings
        char startsWith = 'a';

        // Using lambda expression and forEach loop to filter and print strings
        strings.stream()
            .filter(str -> str.charAt(0) == startsWith)
            .forEach(System.out::println);
    }
}
```

12. Write a Java program that takes an array of integers as input and uses lambda expressions and the **forEach** loop to Calculate the square of each element in an array and print the results.

```
import java.util.Arrays;

public class Main {
    public static void main(String[] args) {
        // Input array of integers
        int[] numbers = {1, 2, 3, 4, 5};

        // Using lambda expression and forEach loop to calculate and print squares
        Arrays.stream(numbers)
            .map(num -> num * num)
            .forEach(System.out::println);
    }
}
```