Level 1 Practice Programs

1. Write a program to compare two strings using the *charAt()* method and check the result with the built-in String *equals()* method.

```java
import java.util.Scanner;
public class StringCompare {
    public static void main(String[] args){
        Scanner input = new Scanner(System.in);

        //Taking user input
        System.out.print("Enter the first string : ");
        String a = input.nextLine();
        System.out.print("Enter the second string : ");
        String b = input.nextLine();

        //Using boolean function
        boolean isEqualCharAt = true;

        //Comparing using CharAt method
        if(a.length() != b.length()){
            isEqualCharAt = false;
        } else {
            for(int i = 0; i < a.length() ; i++){
                if(a.charAt(i) != b.charAt(i)){
                    isEqualCharAt = false;
                    break;
                }
            }
        }

        //Compare using Equals method
        boolean isEqualEqualsMethod = a.equals(b);

        //Printing output
        System.out.println("Comparision using CharAt : " +isEqualCharAt);
        System.out.println("Comparision using Equals : " +isEqualEqualsMethod);

        if(isEqualCharAt == isEqualEqualsMethod){
            System.out.println("Both method gives the same result.");
        }else{
            System.out.println("Both method gives different result.");
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac StringCompare.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java StringCompare
Enter the first string : Hello
Enter the second string : Hello
Comparision using CharAt : true
Comparision using Equals : true
Both method gives the same result.
```

2. **Write a program to create a substring from a String using the *charAt()* method. Also, use the String built-in method *substring()* to find the substring of the text. Finally Compare the two strings and display the results.**

```java
import java.util.Scanner;
public class SubstringCompare {
    public static void main(String[] args){
        Scanner input = new Scanner(System.in);

        //User input
        System.out.print("Enter a string: ");
        String text = input.nextLine().trim();

        System.out.print("Enter substring start index: ");
        int start = input.nextInt();

        System.out.print("Enter substring end index: ");
        int end = input.nextInt();

        //Index in valid range
        if (start >= 0 && start < text.length() && end > start && end <= text.length()) {
            StringBuilder subs = new StringBuilder();
            for (int i = start; i < end; i++) {
                subs.append(text.charAt(i));
            }

            //Printing output
            System.out.println("Substring using charAt(): " + subs.toString());
            System.out.println("Substring using substring(): " + text.substring(start, end));
        } else {
            System.out.println("Please enter valid start and end indexes");
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac SubstringCompare.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java SubstringCompare
Enter a string: Shounak
Enter substring start index: 2
Enter substring end index: 5
Substring using charAt(): oun
Substring using substring(): oun
```

3. **Write a program to return all the characters in a string using the user-defined method, compare the result with the String built-in toCharArray() method, and display the result.**

```java
import java.util.Scanner;
public class Chars {

    // Method to convert string to character array manually
    public static char[] giveChars(String text) {
        char[] value = new char[text.length()];
        for (int i = 0; i < text.length(); i++) {
            value[i] = text.charAt(i);
        }
        return value;
    }

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        // Get input string from user
        System.out.print("Enter a string: ");
        String text = input.nextLine();

        // Convert using user-defined method and built-in method
        char[] userDefined = giveChars(text);
        char[] functionUsed = text.toCharArray();

        // Print results by converting char[] to String
        System.out.println("User defined method  : " + new String(userDefined));
        System.out.println("Built-in function    : " + new String(functionUsed));

    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac Chars.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java Chars
Enter a string: Shounak Roy
User defined method  : Shounak Roy
Built-in function    : Shounak Roy
```

4. Write a program to demonstrate NullPointerException.

```java
import java.util.Scanner;
public class NPE {

    // Method that intentionally causes a NullPointerException
    public static void generateException() {
        String text = null; // Null reference
        int n = text.length(); // This line throws NullPointerException
        System.out.print(n); // This line won't be executed
    }

    public static void main(String[] args) {
        try {
            generateException(); // Call method that throws exception
        } catch (Exception e) {
            System.out.println("Exception caught: " + e); // Print exception info
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac NPE.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java NPE
Exception caught: java.lang.NullPointerException: Cannot invoke "String.length()" because "<local0>" is null
```

5. **Write a program to demonstrate StringIndexOutOfBoundsException**

```java
import java.util.Scanner;
public class SIBE {

    // Method to deliberately access an invalid index in the string
    public static void getChar(String text) {
        int n = text.length();
        // This will throw StringIndexOutOfBoundsException
        System.out.print(text.charAt(n)); // n is out of bounds
    }

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a text: ");
        String text = input.nextLine(); // Read input string

        try {
            getChar(text); // Try to access invalid character
        } catch (Exception e) {
            System.out.println("Tried to access an index that's out of range");
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac SIBE.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java SIBE
Enter a text: Shounak Roy
Tried to access an index that's out of range
```

6. **Write a program to demonstrate *IllegalArgumentException***

```java
import java.util.Scanner;
public class IAE {

    // Method that attempts to create a substring with invalid indices
    public static void getChar(String text) {
        // This will throw StringIndexOutOfBoundsException if start > end
        String sub = text.substring(5, 2);
        System.out.print(sub); // This line will not execute
    }

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a text: ");
        String text = input.nextLine(); // Read user input

        try {
            getChar(text); // Try the invalid substring operation
        } catch (Exception e) {
            // Catch and handle the exception
            System.out.println("Invalid substring index: " + e);
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac IAE.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java IAE
Enter a text: Shounak Roy
Invalid substring index: java.lang.StringIndexOutOfBoundsException: Range [5, 2) out of bounds for length 11
```

7. **Write a program to demonstrate *NumberFormatException***

```java
import java.util.Scanner;
public class NFE {

    // Method that tries to parse input text to an integer
    public static void getChar(String text) {
        // This line throws NumberFormatException if input is not a valid integer
        System.out.print(Integer.parseInt(text));
    }

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        // Ask user to enter a string
        System.out.print("Enter a text: ");
        String text = input.nextLine();

        try {
            getChar(text); // Attempt to parse the input
        } catch (NumberFormatException e) {
            // Catch specific number format exception
            System.out.println("Number Format Exception: Input is not a valid integer.");
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac NFE.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java NFE
Enter a text: Shounak Roy
Number Format Exception: Input is not a valid integer.
```

8. **Write a program to demonstrate *ArrayIndexOutOfBoundsException***

```java
import java.util.Scanner;
public class AIBE {

    // Method to deliberately cause an ArrayIndexOutOfBoundsException
    public static void causeArrayIndexError(String[] array) {
        // Attempting to access an invalid index
        System.out.println(array[array.length + 1]);
    }

    public static void main(String[] args) {
        // Creating a Scanner object to take input from the user
        Scanner input = new Scanner(System.in);

        // Prompting the user to enter names of five students
        System.out.println("Enter the names of five students: ");
        String[] names = new String[5];

        // Reading names from user input
        for (int i = 0; i < 5; i++) {
            names[i] = input.nextLine();
        }

        try {
            // Calling the method to deliberately cause an exception
            causeArrayIndexError(names);
        } catch (ArrayIndexOutOfBoundsException e) {
            // Handling the exception and printing a message
            System.out.println("Exception caught: Array Index Out of Bounds");
            e.printStackTrace(); // Optionally, print the stack trace for debugging
        }
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac AIBE.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java AIBE
Enter the names of five students:
Shounak
Ram
Shyam
Ramesh
Suresh
Exception caught: Array Index Out of Bounds
java.lang.ArrayIndexOutOfBoundsException: Index 6 out of bounds for length 5
        at AIBE.causeArrayIndexError(AIBE.java:7)
        at AIBE.main(AIBE.java:25)
```

9. **Write a program to convert the complete text to uppercase and compare the results.**

```java
import java.util.Scanner;
public class Uppercase {

    // Method to convert text to uppercase using custom Logic
    public static String getUpper(String text) {
        String res = "";
        for (int i = 0; i < text.length(); i++) {
            char ch = text.charAt(i);
            // Convert lowercase letters to uppercase by subtracting 32 (ASCII value difference)
            if (ch >= 'a' && ch <= 'z') {
                res += (char)(ch - 32);
            } else {
                res += ch;
            }
        }
        return res;
    }

    public static void main(String[] args) {
        // Create a Scanner object to read user input
        Scanner input = new Scanner(System.in);

        // Prompt the user to enter a string
        System.out.print("Enter a string: ");
        String text = input.nextLine();

        // Convert the string to uppercase using the built-in method
        String up = text.toUpperCase();

        // Convert the string to uppercase using the user-defined method
        String up1 = getUpper(text);

        // Output both results
        System.out.println("Uppercase using user-defined function: " + up1);
        System.out.println("Uppercase using built-in function: " + up);
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac Uppercase.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java Uppercase.java
Enter a string: Shounak Roy
Uppercase using user-defined function: SHOUNAK ROY
Uppercase using built-in function: SHOUNAK ROY
```

10. Write a program to convert the complete text to lowercase and compare the results.

```java
import java.util.Scanner;
public class Lowercase {

    // Method to convert text to lowercase using custom logic
    public static String getLower(String text) {
        String res = "";
        for (int i = 0; i < text.length(); i++) {
            char ch = text.charAt(i);
            // Convert uppercase letters to lowercase by adding 32 (ASCII value difference)
            if (ch >= 'A' && ch <= 'Z') {
                res += (char)(ch + 32);
            } else {
                res += ch;
            }
        }
        return res;
    }

    public static void main(String[] args) {
        // Create a Scanner object to read user input
        Scanner input = new Scanner(System.in);

        // Prompt the user to enter a string
        System.out.print("Enter a string: ");
        String text = input.nextLine();

        // Convert the string to lowercase using the built-in method
        String lower = text.toLowerCase();

        // Convert the string to lowercase using the user-defined method
        String lower1 = getLower(text);

        // Output both results
        System.out.println("Lowercase using user-defined function: " + lower1);
        System.out.println("Lowercase using built-in function: " + lower);
    }
}
```

```
C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>javac Lowercase.java

C:\Users\Shounak Roy\Desktop\JAVA\Topic 5 - Strings\Level 1>java Lowercase
Enter a string: SHOUNAK ROY
Lowercase using user-defined function: shounak roy
Lowercase using built-in function: shounak roy
```