**PROGRAMS**

**1)**  public class StringExpander {

public static void main(String[] args) {

String input = "a1b10";

String output = expandString(input);

System.out.println("Input: " + input);

System.out.println("Output: " + output);

}

private static String expandString(String input) {

StringBuilder result = new StringBuilder();

char currentChar = '\0';

int count = 0;

for (char c : input.toCharArray()) {

if (Character.isLetter(c)) {

if (currentChar != '\0') {

result.append(String.valueOf(currentChar).repeat(Math.max(0, count)));

}

currentChar = c;

count = 0;

} else if (Character.isDigit(c)) {

count = count \* 10 + Character.getNumericValue(c);

}

}

if (currentChar != '\0') {

result.append(String.valueOf(currentChar).repeat(Math.max(0, count)));

}

return result.toString();

}

}

**2)** public class StringCompression {

public static void main(String[] args) {

String input1 = "AAABBC";

String compressed1 = compressString(input1);

System.out.println("Input: " + input1);

System.out.println("Output: " + compressed1);

String input2 = "AAABBCCCDE";

String compressed2 = compressString(input2);

System.out.println("\nInput: " + input2);

System.out.println("Output: " + compressed2);

}

private static String compressString(String input) {

StringBuilder compressed = new StringBuilder();

int count = 1;

for (int i = 0; i < input.length() - 1; i++) {

if (input.charAt(i) == input.charAt(i + 1)) {

count++;

} else {

compressed.append(input.charAt(i));

if (count > 1) {

compressed.append(count);

}

count = 1;

}}

compressed.append(input.charAt(input.length() - 1));

if (count > 1) {

compressed.append(count);

}

return compressed.toString();

}}

**3)**  public class NumberToWords {

private static final String[] units = {"", "One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight", "Nine"};

private static final String[] teens = {"", "Eleven", "Twelve", "Thirteen", "Fourteen", "Fifteen", "Sixteen", "Seventeen", "Eighteen", "Nineteen"};

private static final String[] tens = {"", "Ten", "Twenty", "Thirty", "Forty", "Fifty", "Sixty", "Seventy", "Eighty", "Ninety"};

public static void main(String[] args) {

int input = 1213;

String words = convertToWords(input);

System.out.println("Input: " + input);

System.out.println("Output: " + words);

}

private static String convertToWords(int number) {

if (number == 0) {

return "Zero";

}

return convertToWordsHelper(number);

}

private static String convertToWordsHelper(int number) {

if (number < 10) {

return units[number];

} else if (number < 20) {

return teens[number - 10];

} else if (number < 100) {

return tens[number / 10] + " " + convertToWordsHelper(number % 10);

} else if (number < 1000)

{

return units[number / 100] + " Hundred " + convertToWordsHelper(number % 100);

} else if (number < 10000)

{

return convertToWordsHelper(number / 1000) + " Thousand " + convertToWordsHelper(number % 1000);

}

else

{

return convertToWordsHelper(number / 10000) + " Ten Thousand " + convertToWordsHelper(number % 10000);

}

}

}

**4)** public class StringComparator {

public static void main(String[] args) {

String str1 = "antonyandcleopatra";

String str2 = "antaniandcleopadra";

compareStrings(str1, str2);

}

private static void compareStrings(String str1, String str2) {

if (str1.length() != str2.length()) {

System.out.println("Input strings must be of equal length.");

return;

}

System.out.println("Output:");

for (int i = 0; i < str1.length(); i++) {

if (str1.charAt(i) != str2.charAt(i)) {

System.out.println(str1.charAt(i) + ", " + str2.charAt(i));

}

}

}

}

**5)**  public class TextJustification {

public static void main(String[] args) {

String text = "Zoho\_Corp\_Madurai";

int desiredLength = 25;

String justifiedText = justifyText(text, desiredLength);

System.out.println("Input: " + text);

System.out.println("Output: " + justifiedText);

}

private static String justifyText(String text, int desiredLength) {

String[] words = text.split("\_");

int numberOfSpaces = words.length - 1;

int totalSpacesToAdd = desiredLength - text.length();

if (numberOfSpaces == 0) {

// No spaces to distribute

return text;

}

int spacesToAddPerWord = totalSpacesToAdd / numberOfSpaces;

int extraSpaces = totalSpacesToAdd % numberOfSpaces;

StringBuilder justifiedText = new StringBuilder(words[0]);

for (int i = 1; i < words.length; i++) {

for (int j = 0; j < spacesToAddPerWord; j++) {

justifiedText.append(' ');

}

if (extraSpaces > 0) {

justifiedText.append(' ');

extraSpaces--;

}

justifiedText.append(words[i]);

}

return justifiedText.toString();

}

}

**6)** public class PalindromeChecker {

public static void main(String[] args) {

String input1 = "malayalam";

System.out.println("Input: " + input1);

System.out.println("Output: " + isPalindrome(input1));

String input2 = "m@ala$$y\*a &lam";

System.out.println("\nInput: " + input2);

System.out.println("Output: " + isPalindrome(input2));

String input3 = "Something";

System.out.println("\nInput: " + input3);

System.out.println("Output: " + isPalindrome(input3));

}

private static boolean isPalindrome(String str)

{

// Remove special characters and convert to lowercase

String cleanedStr = str.replaceAll("[^a-zA-Z0-9]", "").toLowerCase();

int left = 0;

int right = cleanedStr.length() - 1;

while (left < right) {

if (cleanedStr.charAt(left) != cleanedStr.charAt(right)) {

return false;

}

left++;

right--;

}

return true;

}

}

**7)** import java.util.HashSet;

import java.util.Set;

public class StringPermutations {

public static void main(String[] args) {

String input = "Good";

System.out.println("Input: " + input)

Set<String> permutations = generatePermutations(input)

System.out.println("Output: " + permutations);

}

private static Set<String> generatePermutations(String str) {

Set<String> result = new HashSet<>();

generatePermutationsHelper("", str, result);

return result;

}

private static void generatePermutationsHelper(String prefix, String remaining, Set<String> result) {

int n = remaining.length();

if (n == 0)

{

result.add(prefix);

} else

{

for (int i = 0; i < n; i++)

{

String newPrefix = prefix + remaining.charAt(i);

String newRemaining = remaining.substring(0, i) + remaining.substring(i + 1);

generatePermutationsHelper(newPrefix, newRemaining, result);

}

}

}

}

**8)** public class StringMismatch {

public static void main(String[] args) {

String str1 = "AABBCCDD";

String str2 = "ABCDCCAD";

System.out.println("Input: " + str1 + ", " + str2);

findMismatchedSubstrings(str1, str2);

}

private static void findMismatchedSubstrings(String str1, String str2) {

int minLength = Math.min(str1.length(), str2.length());

for (int i = 0; i < minLength; i++) {

if (str1.charAt(i) != str2.charAt(i)) {

int j = i + 1;

while (j < minLength && str1.charAt(j) != str2.charAt(j)) {

j++;

}

System.out.println(str1.substring(i, j) + "," + str2.substring(i, j));

i = j - 1;

}

}

}

}

**9)** import java.util.HashMap;

import java.util.Map;

public class VowelCount {

public static void main(String[] args) {

String input = "India";

System.out.println("Input: " + input);

Map<Character, Integer> vowelCount = countVowels(input);

System.out.println("Output:");

for (char vowel : "aeiouAEIOU".toCharArray()) {

System.out.println(vowel + ": " + vowelCount.getOrDefault(vowel, 0));

}

}

private static Map<Character, Integer> countVowels(String str) {

Map<Character, Integer> vowelCount = new HashMap<>();

for (char ch : str.toCharArray()) {

if ("aeiouAEIOU".indexOf(ch) != -1) {

vowelCount.put(ch, vowelCount.getOrDefault(ch, 0) + 1);

}

}

return vowelCount;

}

}

**10)** public class NextPalindrome {

public static void main(String[] args) {

int input1 = 123;

System.out.println("Input: " + input1);

System.out.println("Output: " + findNextPalindrome(input1));

int input2 = 12345;

System.out.println("\nInput: " + input2);

System.out.println("Output: " + findNextPalindrome(input2));

}

private static int findNextPalindrome(int number) {

char[] digits = Integer.toString(number).toCharArray();

int n = digits.length;

if (allDigitsAreNine(digits)) {

return (int) Math.pow(10, n) + 1;

}

int mid = n / 2;

boolean leftSmaller = false;

int i = mid - 1;

int j = (n % 2 == 0) ? mid : mid + 1;

while (i >= 0 && digits[i] == digits[j]) {

i--;

j++;

}

if (i < 0 || digits[i] < digits[j]) {

leftSmaller = true;

}

while (i >= 0) {

digits[j] = digits[i];

i--;

j++;

}

if (leftSmaller) {

int carry = 1;

mid = (n % 2 == 0) ? mid - 1 : mid;

while (mid >= 0 && carry > 0) {

int num = digits[mid] - '0' + carry;

digits[mid] = (char) ('0' + num % 10);

carry = num / 10;

mid--;

}

}

return Integer.parseInt(new String(digits));

}

private static boolean allDigitsAreNine(char[] digits) {

for (char digit : digits) {

if (digit != '9') {

return false;

}

}

return true;

}

}