

Practice Assignment

By SHREYASI REJA

Question 1

Given an input string and a dictionary of words, find out if the input string can be segmented into a space-separated sequence of dictionary words. See following examples for more details.

This is a famous Google interview question, also being asked by many other companies now a days.

Consider the following dictionary

{ i, like, sam, sung, samsung, mobile, ice,
cream, icecream, man, go, mango }

Input: ilike

Output: Yes

The string can be segmented as "i like".

Input: ilikesamsung

Output: Yes

The string can be segmented as "i like samsung"
or "i like sam sung".

JAVA CODE:-

```
import java.util.HashSet;

import java.util.Set;

public class WordBreakProblem {

    public static boolean wordBreak(String s, Set<String> wordDict) {

        int n = s.length();

        boolean[] dp = new boolean[n + 1];

        dp[0] = true;

        for (int i = 1; i <= n; i++) {

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

                if (dp[j] && wordDict.contains(s.substring(j, i))) {

                    dp[i] = true;

                    break;

                }

            }

        }

        return dp[n];

    }

    public static void main(String[] args) {
```

```
Set<String> wordDict = new HashSet<>();
```

```
wordDict.add("i");
```

```
wordDict.add("like");
```

```
wordDict.add("sam");
```

```
wordDict.add("sung");
```

```
wordDict.add("samsung");
```

```
wordDict.add("mobile");
```

```
wordDict.add("ice");
```

```
wordDict.add("cream");
```

```
wordDict.add("icecream");
```

```
wordDict.add("man");
```

```
wordDict.add("go");
```

```
wordDict.add("mango");
```

```
String input1 = "ilike";
```

```
String input2 = "ilikesamsung";
```

```
String input3 = "i like samsung";
```

```
String input4 = "i like sam sung";
```

```
boolean output1 = wordBreak(input1, wordDict);
```

```
boolean output2 = wordBreak(input2, wordDict);
```

```
boolean output3 = wordBreak(input3, wordDict);
```

```
boolean output4 = wordBreak(input3, wordDict);
```

```
System.out.println("Output for '" + input1 + "': " + (output1 ? "Yes" : "No"));
```

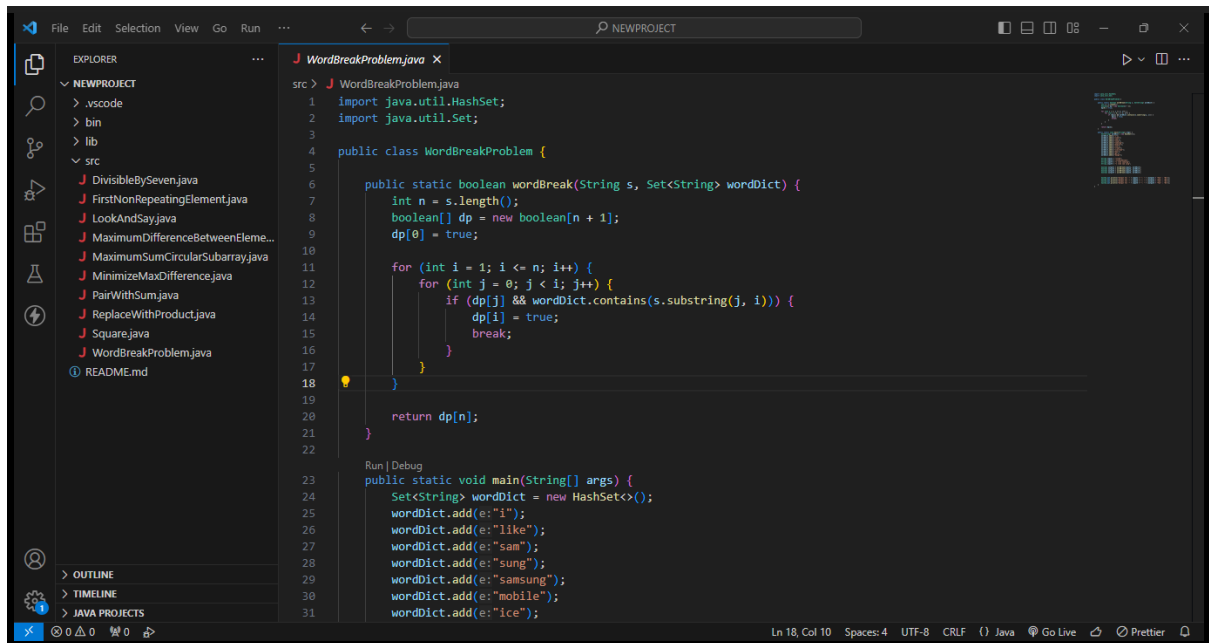
```
System.out.println("Output for '" + input2 + "': " + (output2 ? "Yes" : "No"));
```

```
System.out.println("Output for '" + input3 + "': " + (output3 ? "Yes" : "No"));
```

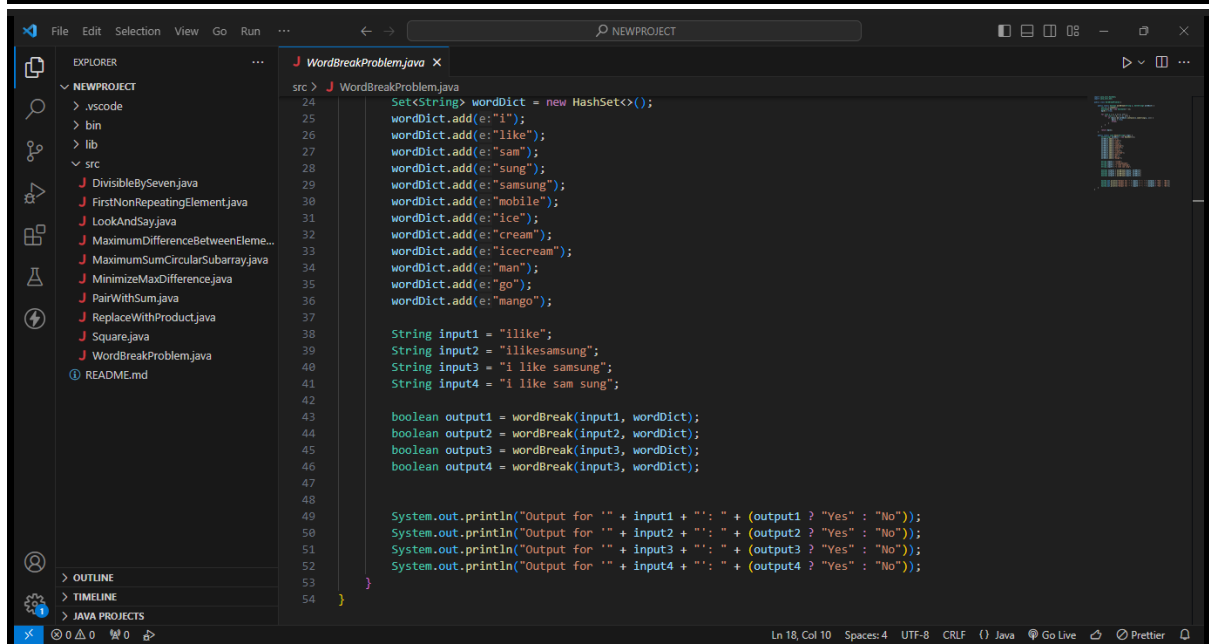
```
System.out.println("Output for '" + input4 + "': " + (output4 ? "Yes" : "No"));
```

```
}
```

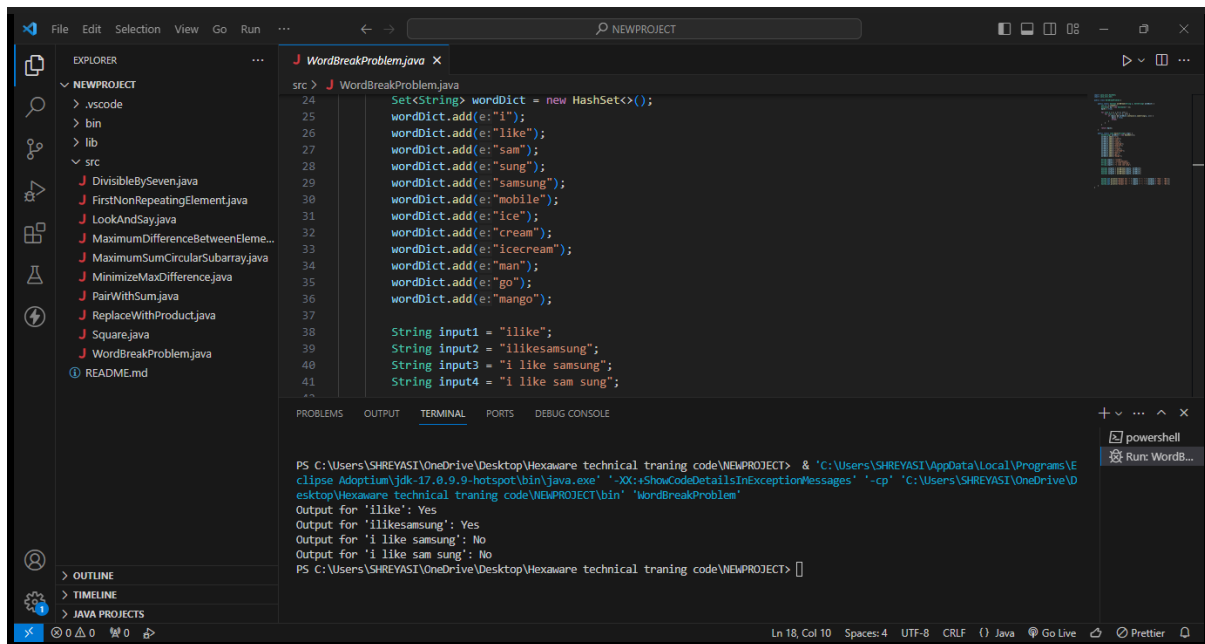
```
}
```



```
WordBreakProblem.java
src > WordBreakProblem.java
1  import java.util.HashSet;
2  import java.util.Set;
3
4  public class WordBreakProblem {
5
6      public static boolean wordBreak(String s, Set<String> wordDict) {
7          int n = s.length();
8          boolean[] dp = new boolean[n + 1];
9          dp[0] = true;
10
11          for (int i = 1; i <= n; i++) {
12              for (int j = 0; j < i; j++) {
13                  if (dp[j] && wordDict.contains(s.substring(j, i))) {
14                      dp[i] = true;
15                      break;
16                  }
17              }
18          }
19
20          return dp[n];
21      }
22
23      Run | Debug
24      public static void main(String[] args) {
25          Set<String> wordDict = new HashSet<>();
26          wordDict.add("i");
27          wordDict.add("like");
28          wordDict.add("sam");
29          wordDict.add("sung");
30          wordDict.add("samsung");
31          wordDict.add("mobile");
32          wordDict.add("ice");
33      }
34  }
```



```
WordBreakProblem.java
src > WordBreakProblem.java
24  Set<String> wordDict = new HashSet<>();
25  wordDict.add("i");
26  wordDict.add("like");
27  wordDict.add("sam");
28  wordDict.add("sung");
29  wordDict.add("samsung");
30  wordDict.add("mobile");
31  wordDict.add("ice");
32  wordDict.add("cream");
33  wordDict.add("icecream");
34  wordDict.add("man");
35  wordDict.add("go");
36  wordDict.add("mango");
37
38  String input1 = "ilike";
39  String input2 = "ilikesamsung";
40  String input3 = "i like samsung";
41  String input4 = "i like sam sung";
42
43  boolean output1 = wordBreak(input1, wordDict);
44  boolean output2 = wordBreak(input2, wordDict);
45  boolean output3 = wordBreak(input3, wordDict);
46  boolean output4 = wordBreak(input3, wordDict);
47
48
49  System.out.println("Output for '" + input1 + "': " + (output1 ? "Yes" : "No"));
50  System.out.println("Output for '" + input2 + "': " + (output2 ? "Yes" : "No"));
51  System.out.println("Output for '" + input3 + "': " + (output3 ? "Yes" : "No"));
52  System.out.println("Output for '" + input4 + "': " + (output4 ? "Yes" : "No"));
53
54  }
```



```
src > J WordBreakProblem.java
24 Set<String> wordDict = new HashSet<>();
25 wordDict.add(e:"i");
26 wordDict.add(e:"like");
27 wordDict.add(e:"sam");
28 wordDict.add(e:"sung");
29 wordDict.add(e:"samsung");
30 wordDict.add(e:"mobile");
31 wordDict.add(e:"ice");
32 wordDict.add(e:"cream");
33 wordDict.add(e:"icecream");
34 wordDict.add(e:"man");
35 wordDict.add(e:"go");
36 wordDict.add(e:"mango");
37
38 String input1 = "ilike";
39 String input2 = "ilikesamsung";
40 String input3 = "i like samsung";
41 String input4 = "i like sam sung";
```

```
PS C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical tranning code\NEWPROJECT> & 'C:\Users\SHREYASI\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.9-hotspot\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical tranning code\NEWPROJECT\bin' 'WordBreakProblem'
Output for 'ilike': Yes
Output for 'ilikesamsung': Yes
Output for 'i like samsung': No
Output for 'i like sam sung': No
PS C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical tranning code\NEWPROJECT> []
```

Ques-2

A number can always be represented as a sum of squares of other numbers. Note that 1 is a square and we can always break a number as $(1*1 + 1*1 + 1*1 + \dots)$. Given a number n , find the minimum number of squares that sum to X .

Examples :

Input: $n = 100$

Output: 1

Explanation:

100 can be written as 10². Note that 100 can also be written as 5² + 5² + 5² + 5², but this representation requires 4 squares.

Input: n = 6

Output: 3

```
public class Square {  
  
    public static int minSquares(int n) {  
  
        int[] dp = new int[n + 1];  
  
        dp[1] = 1;  
        dp[2] = 2;  
  
        for (int i = 3; i <= n; i++) {  
  
            dp[i] = Integer.MAX_VALUE;  
  
            for (int j = 1; j * j <= i; j++) {  
                dp[i] = Math.min(dp[i], 1 + dp[i - j * j]);  
            }  
        }  
    }  
}
```

```
}
```

```
return dp[n];
```

```
}
```

```
public static void main(String[] args) {
```

```
    int input1 = 100;
```

```
    int input2 = 6;
```

```
    int output1 = minSquares(input1);
```

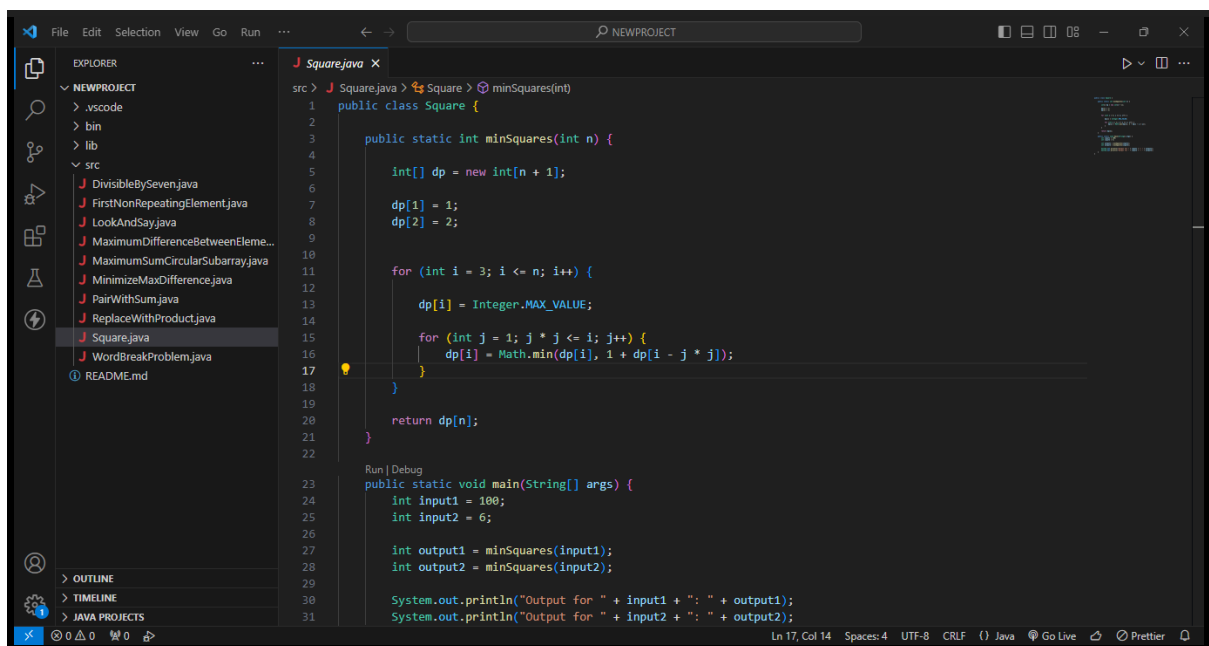
```
    int output2 = minSquares(input2);
```

```
    System.out.println("Output for " + input1 + ": " + output1);
```

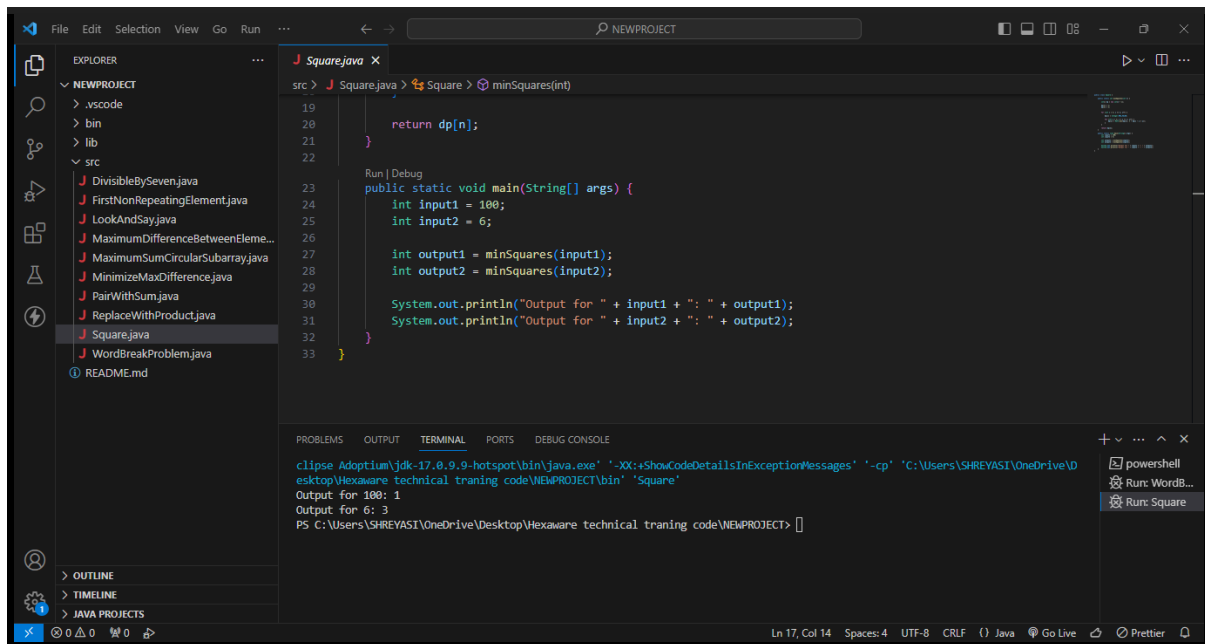
```
    System.out.println("Output for " + input2 + ": " + output2);
```

```
}
```

```
}
```



```
src > J Square.java > Square > minSquares(int)
1  public class Square {
2
3
4      public static int minSquares(int n) {
5
6          int[] dp = new int[n + 1];
7
8          dp[1] = 1;
9          dp[2] = 2;
10
11         for (int i = 3; i <= n; i++) {
12             dp[i] = Integer.MAX_VALUE;
13             for (int j = 1; j * j <= i; j++) {
14                 dp[i] = Math.min(dp[i], 1 + dp[i - j * j]);
15             }
16         }
17         return dp[n];
18     }
19
20     Run | Debug
21     public static void main(String[] args) {
22         int input1 = 100;
23         int input2 = 6;
24
25         int output1 = minSquares(input1);
26         int output2 = minSquares(input2);
27
28         System.out.println("Output for " + input1 + ": " + output1);
29         System.out.println("Output for " + input2 + ": " + output2);
30     }
31 }
```



Ques-3

Given a number N, the task is to check if it is divisible by 7 or not.

Note: You are not allowed to use the modulo operator, floating point arithmetic is also not allowed.

Naive approach: A simple method is repeated subtraction. Following is another interesting method.

Divisibility by 7 can be checked by a recursive method. A number of the form $10a + b$ is divisible by 7 if and only if $a - 2b$ is divisible by 7. In other words, subtract twice the last digit from the

number formed by the remaining digits. Continue to do this until a small number.

Example: the number 371: $37 - (2 \times 1) = 37 - 2 = 35$; $3 - (2 \times 5) = 3 - 10 = -7$; thus, since -7 is divisible by 7, 371 is divisible by 7.

```
public class DivisibleBySeven {  
  
    public static boolean isDivisibleBySeven(int n) {  
  
        if (n < 0) {  
            return isDivisibleBySeven(-n);  
        }  
  
        if (n == 0 || n == 7) {  
            return true;  
        }  
  
        if (n < 10) {  
            return false;  
        }  
  
        return isDivisibleBySeven((n / 10) - 2 * (n % 10));  
    }  
}
```

```

public static void main(String[] args) {

    int input1 = 371;

    int input2 = 14;

    boolean output1 = isDivisibleBySeven(input1);

    boolean output2 = isDivisibleBySeven(input2);

    System.out.println("Is " + input1 + " divisible by 7 " + (output1 ? "Yes" : "No"));

    System.out.println("Is " + input2 + " divisible by 7 " + (output2 ? "Yes" : "No"));

}
}

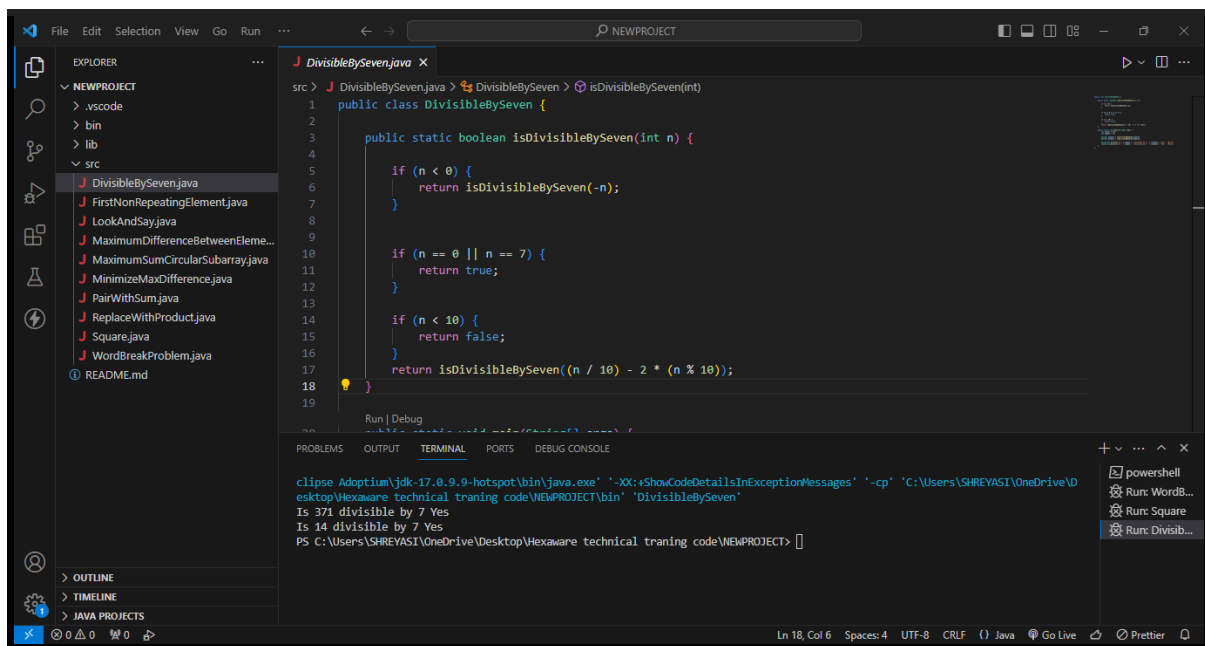
```

```

src > J DivisibleBySeven.java > DivisibleBySeven > isDivisibleBySeven(int)
1  public class DivisibleBySeven {
2
3      public static boolean isDivisibleBySeven(int n) {
4
5          if (n < 0) {
6              return isDivisibleBySeven(-n);
7          }
8
9          if (n == 0 || n == 7) {
10             return true;
11         }
12
13         if (n < 10) {
14             return false;
15         }
16         return isDivisibleBySeven((n / 10) - 2 * (n % 10));
17     }
18
19
20     public static void main(String[] args) {
21         int input1 = 371;
22         int input2 = 14;
23
24         boolean output1 = isDivisibleBySeven(input1);
25         boolean output2 = isDivisibleBySeven(input2);
26
27         System.out.println("Is " + input1 + " divisible by 7 " + (output1 ? "Yes" : "No"));
28         System.out.println("Is " + input2 + " divisible by 7 " + (output2 ? "Yes" : "No"));
29     }
30 }
31

```

Ln 18, Col 6 Spaces: 4 UTF-8 CRLF () Java Go Live Prettier



Question-4

Find the n 'th term in Look-and-say (Or Count and Say) Sequence. The look-and-say sequence is the sequence of the below integers:

1, 11, 21, 1211, 111221, 312211, 13112221,
1113213211, ...

How is the above sequence generated?

n 'th term is generated by reading $(n-1)$ 'th term.

The first term is "1"

Second term is "11", generated by reading first term as "One 1"

(There is one 1 in previous term)

Third term is "21", generated by reading second term as "Two 1"

Fourth term is "1211", generated by reading third term as "One 2 One 1"

and so on

Input: n = 3

Output: 21

Input: n = 5

Output: 111221

```
public class LookAndSay {  
  
    public static String findNthTerm(int n) {  
        if (n <= 0) {  
            return "Invalid input";  
        }  
  
        if (n == 1) {  
            return "1";  
        }  
  
        String prevTerm = "1";
```

```

    for (int i = 2; i <= n; i++) {

        prevTerm = generateNextTerm(prevTerm);

    }

    return prevTerm;

}

public static String generateNextTerm(String prevTerm) {

    StringBuilder result = new StringBuilder();

    int count = 1;

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

        if (prevTerm.charAt(i) == prevTerm.charAt(i - 1)) {

            count++;

        } else {

            result.append(count).append(prevTerm.charAt(i - 1));

            count = 1;

        }

    }

    result.append(count).append(prevTerm.charAt(prevTerm.length() - 1));

    return result.toString();

}

public static void main(String[] args) {

    int n1 = 3;

```

```
int n2 = 5;
```

```
System.out.println("Input: n = " + n1);
```

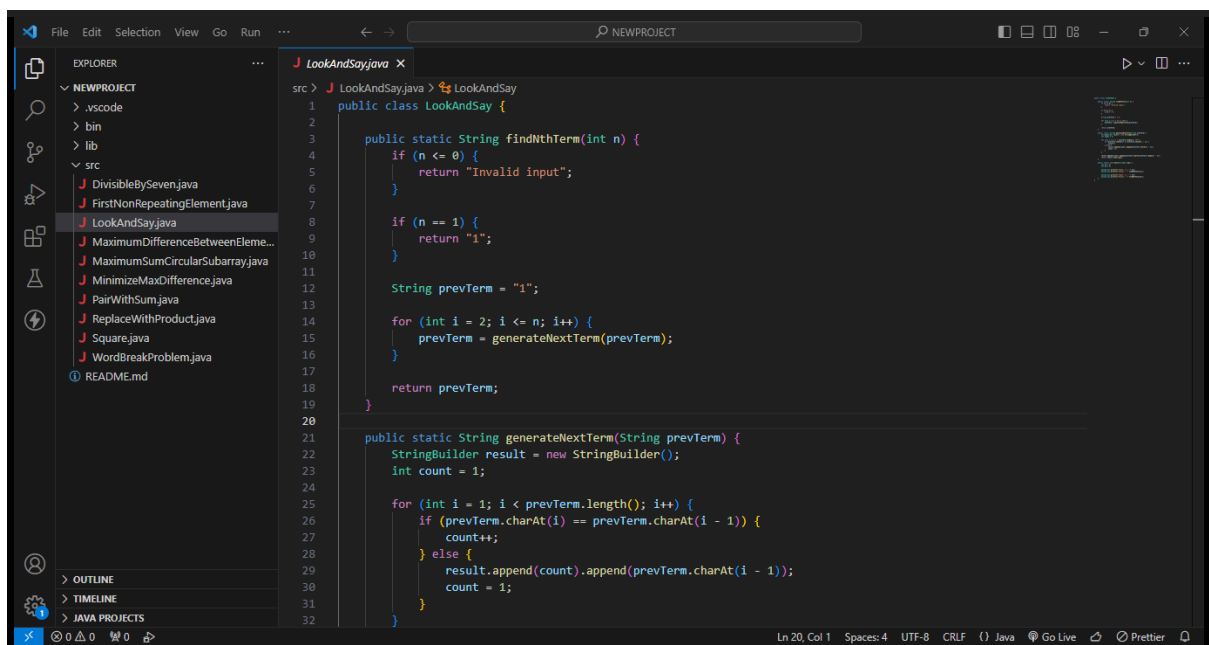
```
System.out.println("Output: " + findNthTerm(n1));
```

```
System.out.println("Input: n = " + n2);
```

```
System.out.println("Output: " + findNthTerm(n2));
```

```
}
```

```
}
```



The screenshot shows a code editor with a dark theme. On the left, the Explorer panel shows a project named 'NEWPROJECT' with a 'src' folder containing several Java files, including 'LookAndSay.java'. The main editor window displays the code for 'LookAndSay.java'. The code defines a public class 'LookAndSay' with two static methods: 'findNthTerm' and 'generateNextTerm'. The 'findNthTerm' method handles edge cases for n <= 0 and n == 1, then iteratively generates the next term in the sequence. The 'generateNextTerm' method uses a StringBuilder to build the next term by counting the frequency of each digit in the previous term. The status bar at the bottom indicates the cursor is at line 20, column 1, with 4 spaces, UTF-8 encoding, and CRLF line endings.

```
1 public class LookAndSay {
2
3     public static String findNthTerm(int n) {
4         if (n <= 0) {
5             return "Invalid input";
6         }
7
8         if (n == 1) {
9             return "1";
10        }
11
12        String prevTerm = "1";
13
14        for (int i = 2; i <= n; i++) {
15            prevTerm = generateNextTerm(prevTerm);
16        }
17
18        return prevTerm;
19    }
20
21    public static String generateNextTerm(String prevTerm) {
22        StringBuilder result = new StringBuilder();
23        int count = 1;
24
25        for (int i = 1; i < prevTerm.length(); i++) {
26            if (prevTerm.charAt(i) == prevTerm.charAt(i - 1)) {
27                count++;
28            } else {
29                result.append(count).append(prevTerm.charAt(i - 1));
30                count = 1;
31            }
32        }
33    }
34 }
```

```
src > J LookAndSay.java > LookAndSay
26 (prevTerm.charAt(i) == prevTerm.charAt(i - 1)) {
27     count++;
28 } else {
29     result.append(count).append(prevTerm.charAt(i - 1));
30     count = 1;
31 }
32 }
33
34 result.append(count).append(prevTerm.charAt(prevTerm.length() - 1));
35 return result.toString();
36 }
37
Run | Debug
38 public static void main(String[] args) {
39     int n1 = 3;
40     int n2 = 5;
41
42     System.out.println("Input: n = " + n1);
43     System.out.println("Output: " + findNthTerm(n1));
44
45     System.out.println("Input: n = " + n2);
46     System.out.println("Output: " + findNthTerm(n2));
47 }
48 }
49
50
```

```
src > J LookAndSay.java > LookAndSay
35 result.append(count).append(prevTerm.charAt(prevTerm.length() - 1));
36 return result.toString();
37 }
38
Run | Debug
39 public static void main(String[] args) {
40     int n1 = 3;
41     int n2 = 5;
42
43     System.out.println("Input: n = " + n1);
44     System.out.println("Output: " + findNthTerm(n1));
45
46     System.out.println("Input: n = " + n2);
47     System.out.println("Output: " + findNthTerm(n2));
48 }
49 }
50
```

PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE

```
clipse Adoptium\jdk-17.0.9-hotspot\bin\java.exe ^-XX:+ShowCodeDetailsInExceptionMessages ^-cp ^C:\Users\SHREYASI\OneDrive\De
esktop\Hexaware technical tranning code\NEWPROJECT\bin^ LookAndSay
Input: n = 3
Output: 21
Input: n = 5
Output: 111221
PS C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical tranning code\NEWPROJECT>
```

Run: WordB...
Run: Square
Run: Divisib...
Run: LookA...