

Problems based on Recursion – 8

Assignment Solutions



Q1. Given the number of digits n in a number, print all n-digit numbers whose digits are strictly increasing from left to right.

Input: n = 2

Expected Output:

01 02 03 04 05 06 07 08 09 12 13 14 15 16 17 18 19 23 24 25 26 27 28
29 34 35 36 37 38 39 45 46 47 48 49 56 57 58 59 67 68 69 78 79 89

Explanation:

- Create a recursive function with n, an output string to store the resultant strings and start variable which represents the current digit to be added to the output string, as parameters.
 - We start from the leftmost position of a possible N-digit number and fill it from a set of all digits greater than its previous digit. i.e. fill the current position with digits [i to 9] where i is its previous digit. After filling the current position, we recurse for the next position with strictly increasing numbers.

Code: <https://pastebin.com/mb3j5AMT>

```
/Library/Java/JavaVirtualMachines/jdk-19.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA CE.app/Contents/lib/idea_rt.jar=53781:/Applications/Intelli  
Enter the number:  
2  
01 02 03 04 05 06 07 08 09 12 13 14 15 16 17 18 19 23 24 25 26 27 28 29 34 35 36 37 38 39 45 46 47 48 49 56 57 58 59 67 68 6  
Process finished with exit code 0  
|
```

Q2. A string is called special if it consists of only stars('*) and dashes('‐'), and the number of stars is more than the number of dashes for any prefix of the string. Given a positive integer n, print all the special strings of size n.

Input1: n = 1

Output: *

Explanation:

- Create a recursive function that has 4 parameters-
 - remainingChars - the number of characters left to append in our answer to make its size equal to n
 - ans - the prefix of the string that has been formed so far
 - numberOfDashes - the number of dashes in the answer formed so far
 - numberofStars - the number of stars in the answer formed so far
 - Base case - remainingChars becomes equal to 0. At this point we just print the ans string.
 - At any call we have 2 choices-
 - Append a star to the answer- there is no condition for appending stars to our answer.
 - Append dash to the answer- to append dash to our answer we need to check if appending dash to our answer keeps the number of dashes less than or equal to the number of stars in the prefix formed so far or not. If it fulfills the condition, we append dash to our prefix and form the remaining string.

Code: <https://pastebin.com/kCrdXSzb>

```
C:\Users\akshi\.jdks\openjdk-19.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.2.1\lib\idea_rt.jar" -Dfile.encoding=UTF-8
3
 ***
 **-
 **

Process finished with exit code 0
```

Q3. Given a set of characters and a positive integer k, print all possible strings of length k that can be formed from the given set.

Examples:

Input:

Size of set = 2
Set = {a, b}
k = 3

Output:

aaa
aab
aba
abb
baa
bab
bba
Bbb

Explanation:

- Create a recursive function that has 4 parameters-
 - chars – the set of characters
 - remainingChars – the number of characters needed to make the length of our current string equal to k
 - ans – the string that has been formed so far
- Base case – remainingChars become equal to 0. At this point we just print the ans string.
- At any call we can append any one of the characters into our current string and call the recursive function on the newly formed string.

Code: <https://pastebin.com/aph7NJUp>

```
C:\Users\akshi\.jdks\openjdk-19.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.2.1\lib\idea_rt.jar" -Dfile.encoding=UTF-8
2
x y
2
xx
xy
yx
yy

Process finished with exit code 0
```

Q4. Given an input string of digits, find all combinations of numbers that can be formed using digits in the same order.

Examples:

Input : 123

Output : 1 2 3

1 2 3

1 2 3

1 2 3

Explanation:

- Create a recursive function that has 4 parameters-
 - nums – the string of digits
 - idx – the index of the current digit
 - ans – the string that has been formed so far
- Base case – idx reaches the end of nums. At this point we just print the ans string.
- At any call we will add the current digit to our answer. After that we have 2 choices-
 - Add a space after the current digit to denote the start of a new number. We can do this only if we have another digit after our current digit.
 - Not to add a space.

Code: <https://pastebin.com/88jaSNzy>

```
C:\Users\akshi\.jdks\openjdk-19.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Communi
3782
3782
37 8 2
37 82
37 8 2
3 782
3 78 2
3 7 82
3 7 8 2

Process finished with exit code 0
```

Q5. A string is called special if it consists of only stars('*) and dashes(' -'), and there are no consecutive stars in the string. Given a positive integer K, print all the special strings of size K.

Examples:

Input : K = 3

Output :

--*

-*-

*--

-

Explanation:

- Create a recursive function that has 4 parameters-
 - remainingChars - the number of characters left to append in our answer to make its size equal to k
 - ans - the prefix of the string that has been formed so far
- Base case - remainingChars become equal to 0. At this point we just print the ans string.
- At any call we have 2 choices-
 - Append a dash to the answer- there is no condition on appending dashes
 - Append a star to the answer- to append a star to our answer, we just need to check that either it is the first character of our string or the previous character added to our string wasn't a star.

Code: <https://pastebin.com/d683Rzzc>

```
C:\Users\akshi\.jdks\openjdk-19.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2023.2.1\lib\idea_rt.jar=5300,C:\Program Files\JetBrains\IntelliJ IDEA 2023.2.1\bin" -Dfile.encoding=UTF-8 -jar C:\Users\akshi\IdeaProjects\Assignment-Solutions\out\artifacts\Assignment_Solutions_jar\Assignment-Solutions.jar 4
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---*
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*---*
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Process finished with exit code 0
```