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Print all combinations of points that can compose a given number

You can win three kinds of basketball points, 1 point, 2 points, and 3 points. Given a total score n, print out all the combination to compose n.

Examples:

For n = 1, the program should print following:

For n = 2, the program should print following:

1 1

2

For n = 3, the program should print following:

111

12

2 1

3

For n = 4, the program should print following:

1111

112

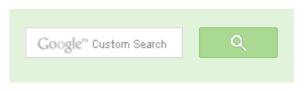
121

13

2 1 1

22

3 1





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Algorithm:

At first position we can have three numbers 1 or 2 or 3.

First put 1 at first position and recursively call for n-1.

Then put 2 at first position and recursively call for n-2.

Then put 3 at first position and recursively call for n-3.

If n becomes 0 then we have formed a combination that compose n, so print the current combination.

Below is a generalized implementation. In the below implementation, we can change MAX POINT if there are higher points (more than 3) in the basketball game.

```
#define MAX POINT 3
#define ARR SIZE 100
#include<stdio.h>
/* Utility function to print array arr[] */
void printArray(int arr[], int arr size);
/* The function prints all combinations of numbers 1, 2, ...MAX POINT
   that sum up to n.
   i is used in recursion keep track of index in arr[] where next
   element is to be added. Initital value of i must be passed as 0 */
void printCompositions(int n, int i)
  /* array must be static as we want to keep track
   of values stored in arr[] using current calls of
   printCompositions() in function call stack*/
  static int arr[ARR SIZE];
  if (n == 0)
    printArray(arr, i);
  else if (n > 0)
    int k;
    for (k = 1; k \le MAX POINT; k++)
      arr[i] = k;
      printCompositions(n-k, i+1);
```



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```
/* UTILITY FUNCTIONS */
/* Utility function to print array arr[] */
void printArray(int arr[], int arr size)
  int i;
  for (i = 0; i < arr size; i++)</pre>
    printf("%d ", arr[i]);
  printf("\n");
/* Driver function to test above functions */
int main()
  int n = 5;
  printf("Differnt compositions formed by 1, 2 and 3 of %d are\n", n);
  printCompositions(n, 0);
  getchar();
  return 0;
```

Asked by Aloe

Please write comments if you find any bug in above code/algorithm, or find other ways to solve the same problem.

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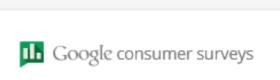
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hour ago



ashish • 2 months ago

Can someone please explain how recursion is working here or give a dry run of

I am not able to understand when k=2, printCompositions(-1,2) then how it is r ^ V ·



puneetbestpat • 9 months ago

I was wondering if this method can be applied if the MAX POINT is 10'9. would

/* Paste your code here (You may **delete** these lines **if not** writing co



puneetbestpat • 9 months ago

I was wondering if this method can be applied if the MAX POINT is 10'9. would A | V .



abhishek08aug • a year ago

Intelligent:D

A | V .



satya · 3 years ago

@all Can You Explain The Time Complexity of The Code.?? is it n*2'n or simply 2'n can some one prove it

Reply ASAP.



prakhar → satya · 2 years ago

May be a loose upper bound is O(MAX POINT'n).

newCoder3006 If the array contains negative numbers also. We...

Find subarray with given sum · 1 hour ago

AdChoices [>

- ► Print a Number
- Combinations
- ► Java Print

AdChoices [>

- ► Numbers Number
- ▶ Print Value
- Print Track

AdChoices D

- ► Print Program
- ► Print Out
- Yes Print

Carr someone explain a lighter upper bound :



WgpShashank ⋅ 3 years ago

```
class PrintAllCombinations
      public static void main(String[] args)
               int s = 9;
               //int[] a = new int[] {2,3,6,7,8};
               int[] a = new int[] {2,3,6,7,8,0,10,66,45,3,56,89};
               getCombinatsions(a, 0, s, 0, "");
       }
       static void getCombinatsions(int[] a, int j, int desiredSum, :
               if(desiredSum == currentSum) {
                       System.out.println(st);
                       return;
```

see more



^ V ·

WgpShashank • 3 years ago

Hi Geeks, I Just Modified The Above Program to Printb Unique Combination th know if anything wrong in this code

```
#define MAX_POINT 4
#define ARR_SIZE 100
#include <stdio.h>
```

```
/* Utility function to print array arr[] */
void printArray(int arr[], int arr_size);

/* The function prints all combinations of numbers 1, 2, ...MAX_POINT
    that sum up to n.
    i is used in recursion keep track of index in arr[] where next
    element is to be added. Initial value of i must be passed as 0 */
void printCompositions(int arr[ARR_SIZE],int n, int i)
{
    /* array must be static as we want to keep track
```

see more





coder → WgpShashank • 2 years ago
for (i = 0; i arr[i+1]) flag=0;

i guess u wrote in hurry..please update it



WgpShashank → 3 years ago for Explanation See here

http://1.bp.blogspot.com/-CnDx...





Shashank Mani Narayan • 3 years ago

@geeksforGeeks this will print duplicate values as well we have to modify it...

like for 3

```
it will print
12
21
but we wants only one (unique) way ??
```



raman → Shashank Mani Narayan • 3 years ago

what modification we have to do in given program so that it can print th number....Ites wait for GeeksforGeeks How they approach for this ques



Aravind_Sen • 4 years agono. of calls to functions can be optimizedand the size of array should be MAX POINT

```
void printCompositions(int n, int i)
{

/* array must be static as we want to keep track
  of values stored in arr[] using current calls of
  printCompositions() in function call stack*/

  static int arr<strong>[MAX_POINT];
  int k;
  for (k = 1; k <= MAX_POINT; k++)
  {
    arr[i]= k;
    if(n-k >0 )
        printCompositions(n-k, i+1);
    else if(n-k==0)
        printArray(arr, i+1);
```



atul → Aravind_Sen • 2 years ago

ok sorry this will work, i skipped i+1 you were passing to printArray.





atul → Aravind_Sen · 2 years ago

your optmized code wont works:-

this will work;

```
for(k=1;k<=max;k++)
                       if(num > 0)
                                arr[arrlen]=k;
                                if(num-k > 0)
                                  combination(num-k, max, arrlen+
                                else if(num-k == 0)
                                         for(p=0;p<arrlen+1;p++
```

see more



Yes, true. We could check for the value of (n-k) to see if it is greater that

Will reduce the recursion overhead.





sharat04 → reg_frenzy · 3 years ago

agreed. I had the same concern







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