**Week -2 : Arrays**

**Submit Date : 5th September**  
  
An array is a data structure used to store multiple elements of same type  
If a[10] is an array then ,it would be created in memory as :

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a[0] | a[1] | a[2] | a[3] | a[4] | a[5] | a[6] | a[7] | a[8] | a[9] |

To say in easiest words , array creates n variables ,where n is the size of the array .you can consider a[0] as one variable ,a[1] as one more like that soo on .  
  
To store in a variable called b,we use ‘&b’ in scanf ,similarly to store in a[4] we use &a[4] ,like that   
Now you can replace that 4 with an i (looping from 0 to n-1) to store all elements entered by keyboard into array memory

When to Use Arrays   
->When you want to store large amounts of similar data , without declaring individual variables for each  
  
Further reading :

-> <http://geeksquiz.com/arrays-in-c-language-set-1-introduction>   
-><http://www.tutorialspoint.com/cprogramming/c_arrays.htm>   
-><http://www.programiz.com/c-programming/c-multi-dimensional-arrays>  
  
Link of My favourite Compiler :  
Code-Blocks - <http://sourceforge.net/projects/codeblocks/files/Binaries/13.12/Windows/codeblocks-13.12mingw-setup.exe/download>  
(NO need to use clrscr ,or getch or conio.h here in codeblocks ,F9 for compile and run )   
Please Don’t use Turbo C :p Its outdated .  
  
**How to Submit :   
1)For Each question below create a File according to the question , Like commonElements.c , IntergerToBitArray.c ,Combine2SortedArrays.c ,2dMatrixDiagonals.c ,etc**

**2)Copy the question from this Doc into the file you created as a comment in the First few lines . And code the question .**

**3)Make sure you use functions whenever possible ,ie for printing final array etc .**

**4)You might encounter cases where you modify the array in the function ,but the changes are not visible in main function , That’s an interesting concept to learn ,Do message me if you encounter that .**

**5)At the end also Write the Time complexity of the Code you wrote , ie How much time your code takes for an input of N numbers.**  
  
Easy Programs for Practice : (No need to submit these ,But make sure you know how to code these before jumping to next Section )(Time Required -2 Days )  
  
1) Take input to an Array , and Output those , Use %3d like that to display numbers in a better way   
2)Sum of All elements in an array   
3)Given an Array of elements and a number K , count how many numbers in that array are exactly divisible by K   
I/P: 1,2,3,4,5,6,7,8,9,10 and K=3  
O/P:Count=3  
4)Learn a sorting technique like **bubble sort ,insertion sort** etc So you know know how to sort the elements , and work out your logic , You will even learn double loop logics

Medium Questions [Submit these ,At Max Time required – 3days ]

**1)**Given two arrays , array1 and array2 , Copy all the elements which are common in both arrays into array3 ,[Don’t just print the common elements without copying them in array3]  
I/p:   
array1: 2,5,7,3,4  
array2: 4,3,9,13,45  
O/p:  
array3: 3,4

**2)**Given an integer and an array of size 32 ,Convert the integer into a binary form and store the bits in the array  
I/p: 8  
O/p: 1,0,0,0  
(You might want to reverse the digits , or the array ,Think how you would represent the bits ,from first to last ,or last to first ,your wish , but I need them in an array )

**3)**Given Two sorted arrays ,Combine them into a final sorted array   
if 1,5,9 and 2,4,7,10,15 are two arrays ,Final array c would be 1,2,4,5,7,9,10,15

**4)** Given an array of numbers a , Output an array called fact\_Array , which consists of the factorial of the given numbers in same indexes   
[Don’t just print it ,I need actual factorial values in fact\_Array,Use Functions if possible )  
I/P : 1,2,6,3,4  
O/P: 1,2,720,24,6  
Explanation , As a[2] is 6 ,and 6 factorial is 720 so fact\_array[2] is 720

Hard Questions [Submit these]

**1)**Transpose of a 2d Array . Its simple ,Read what Tranpose of a matrix is in google [Should work with even 5x5 array ]  
I/p:  
1 3  
4 5  
o/p:  
1 4  
3 5

**2)**Given a number n ,output a 2d Array or a Square matrix (n\*n) satisfying these 3 conditions   
->All elements on the two diagonals of the final array are zero   
->All elements in the upper right triangle of the final array are equal to 1  
->All elements in lower left triangle of final array are equal to -1

I/P: 4  
O/P:  
 0 1 1 1  
-1 0 1 1  
-1 -1 0 1  
-1 -1 -1 0

**3)**Given an array of numbers ,Modify the array in place such that ,it satisfies the condition at end   
Final a[i]=Prev a[i-1] + Prev a[i+1]   
where a[-1] and a[n] is 0

I/P :

1 2 3 4 5

O/P:

2 4 6 8 4   
  
Explanation :

Intially a[1] is 2 ,and a[0] is 1 and a[2] is 3 ,   
So finally a[1] became , 4 which is the sum of a[0] and a[2]  
Similarly a[2] became sum of initial a[1] and a[3] values etc  
  
Note :  
In Place means **,you cant create an extra array ie the Logic must be done without a temporary array**   
Further Practice (MCQ):  
http://www.indiabix.com/c-programming/arrays/044001