C Language – Arrays and Pointers

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Header Files

```
#include <stdio.h>
#include <stdlib.h>
#include "circle.h"

//extern double  circleArea(int radius) ;
//extern double circleCircumference(int radius) ;

int main(int argc, char *argv[])
{

  printf(" Circle area = %f" , circleArea(5) );
  printf(" Circle circumference = %f" , circleCircumference(5) );

  system("PAUSE");
  return 0;
}
```

```
/* Circle Header file  */
/* defined by RP on 29th Dec 2014 */
double  circleArea(int radius) ;
double circleCircumference(int radius) ;
```

```
#include <stdio.h>
#include <stdlib.h>

const double pi = 3.1415 ;

double  circleArea(int radius)
{

  double area = pi * radius * radius  ;
  return area;
}

double circleCircumference(int radius)
{
     double c  = 2 * pi * radius ;
     return c;

}
```

** refer circle.c, circle.h, headerFilesSample.c

Static Variables

```
#include <stdio.h>
// sample program to test static variable
main()
{
  int i ;
  for(i=0; i <= 5 ; i++)
  {
       testStatic() ;
  }
}

testStatic()
{
   static int myStaticVar = 0;

   myStaticVar = myStaticVar + 10;
   printf(" myStaticVar value %d \n" , myStaticVar );

}
```

Recursion

```
#include <stdio.h>
// sample program : Recursive function
main()
{
  int i ;
  printf("factorial of 4 = %d" , factorial(7) ) ;
}

factorial(num)
{
   printf("%d \n" , num);
   if (num == 1)
      return 1;
   else
      return ( num * factorial(num - 1)) ;

}
```

Pointers

```
 #include <stdio.h>
// sample program : pointers
main()
{
  int *i ;   // i is pointer to integet
  int x, y, z ; // integers
  x = 100 ;
  y = 200;
  z = 300 ;

  i = &x ;  // i points to x
  incrementby100( i) ;
  printf("value of x = %d \n" , *i ) ;

  i = &y ; // i points to y
  incrementby100( i) ;
  printf("value of y = %d  \n" , *i ) ;

  i = &z ; // i points to z
  incrementby100( i) ;
  printf("value of z = %d  \n" , *i ) ;
}

incrementby100(int *i)
{
   *i = *i + 100;
}
```

Arrays - pointer

```
 #include <stdio.h>
// sample program : array pointers
main()
{
  int *intpointer ;   // i is pointer to an integer
  int x[10] ; // array of integers

  int i ;
  // initialize array
  for (i = 0; i<= 10; i++)
     x[i] = 10*i ;

  intpointer = &x[0] ;  // intpointer points to x[0]

  i = 0 ;
  while( i <= 10)
     {
         printf("x[%d] value is %d \n " , i, *intpointer  );
         intpointer++ ;  i++ ;
     }
}
```

Assignments

1. Write a library of functions for Rectangle and square (area, perimeter). Write all four functions in one source file – rectangle.c , main file in findareas.c, function definitions in rectangle.h

2. Write a function named countMe() to count the number of times the function (countMe) is called. Use static variable. Print the value after calling the function 5 times.

3. Given a number 6, print value of 6*5*4*3*2*1. Use recursive function.

4. Declare an array of ten numbers of type double, print values in reverse order starting from 10^{th} element to the 0^{th} element. Use pointers.

5. From the same array (point 4), print alternative values (0, 2, 4, 6, 8 and 10^{th} elements only). Use pointers.