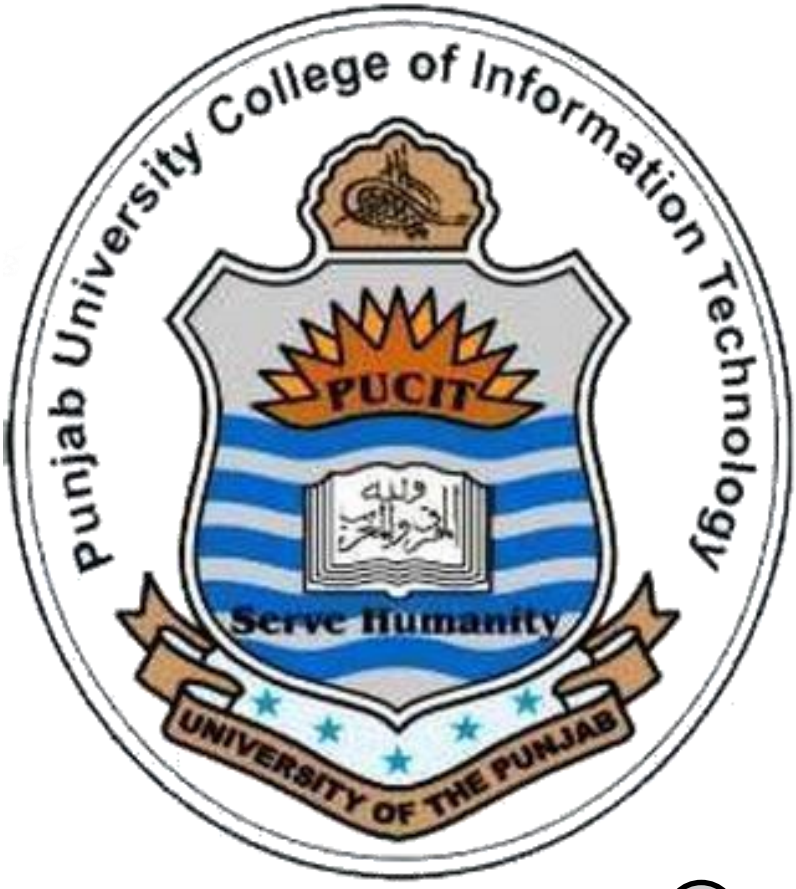
PROGRAMMING FUNDAMENTALS

BS-CS Fall 2015 (MORNING)

Assignment #2



Submitted to:

Miss. Sadia Shehzad

Submitted by:

Muhammad Azam

Roll No: BCSF15M017

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Q#1

Write pseudo code to generate a following numbers structure:

```
1
1 2 1
1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

Solution:

```
start
l=5 ,i=1 , j, k                    // I is outer loop control, j is inner loop control , k holds printing values
while (l>=1)
{
      j=1
      k=1
      while (j<=i+4)
      {
        If (j<l)
         Print "\t"
        else
        {
           Print"\t", k
          if(j<5)
             k=k+1
          else
             k=k-1
        }
        j=j+1
      }
      i=i+1
      l=l-1
       Print  "\n"
}
                                   End
```

Q#2:

Write a pseudo code to print Pascal triangle.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

Solution:

```
start

 i=1, j, k ,x=1 ,lines=5
while (i<=lines)
{
        spaces=lines
        while (spaces >=i)
         {
              Print " "
              spaces= spaces -1
          }
          k=x
          while (k!=0)
         {
               Print  k%10
               k=k/10
          }
            x=x*11
            Print  "\n"
            i=i+1
 }
End
```

Q#3: Write a pseudo code to display the following number structure:

```
123454321
 2345432
  34543
   454
    5
```

Solution:

```
        Start
 lineNumber=0,totalLines=5,i,j
while(lineNumber<=totalLines)
{
  i=1
  j=0
  while(i<totalLines*2-lineNumber)
  {
    if(i<=totalLines)
      j=j+1
    else
      j=j-1
    if(i<=lineNumber)
       Print  " "
    else
       Print  j
    i=i+1
  }
   Print  "\n"
  lineNumber= lineNumber+1
}
        END
```

Q#4: Write pseudo code to display the following.

A
AB
ABC
ABCD
ABCDE
ABCD
ABC
AB
A

Solution:

```
            Start
      totalLines=9,mid=totalLines/2+1, lineNumber=1, spaces,
                                characters,ch
while(lineNumber<=totalLines)
{
        if (lineNumber<=mid)
        {
            spaces=mid-lineNumber
            characters =lineNumber
        }
        else {
            spaces=lineNumber-mid
            characters =totalLines-lineNumber+1
            }
       While (spaces>=1){
            Print " "
            Spaces= spaces-1
            }
      ch='A'
      while (characters>=1)
      {
          Print ch
          ch =ch+1
          characters = characters-1
     }   lineNumber= lineNumber+1
    Print  "\n"
}          END
```

Q#5:Write a C program to print the following number rectangle structure:

```
12321
12  21
1    1
12  21
12321
```

Solution:

```
#include<stdio.h>
main()
{
   int lineNumber=1, totalLines=5 ,i,mid=totalLines/2+1,j ;
   while(lineNumber<=mid)
   {
      i=1;
      j=1;
      while (i<=mid)
      {
         if (lineNumber+i>=5)
            printf(" ");
         else
            printf("%d" ,j);
         i++;
         j++;
      }
      i=1;
      j=2;
      while (i<mid)
      {
         if(i<lineNumber-1)
            printf(" ");
         else
            printf("%d" ,j);
         i++;
         j--;
      }
      printf("\n");
      lineNumber++;
   }
```

```
while(lineNumber<=totalLines)
      {
         i=1;
         j=1;
         while(i<=totalLines)
         {
            if(i==3 && lineNumber==totalLines-1)
               printf(" ");
            else
               printf("%d",j);
            i++;
            if(i<=mid)
               j++;
            else
               j--;
         }
         lineNumber++;
         printf("\n");
      }
}
```

Q#6:

Write pseudo code to print binary equivalent of a decimal number.

a. Input a decimal number

b. Show how many bits required to store its binary equivalent (8, 16, 24 or 32)

c. Convert and print its binary equivalent

Solution:

```
   number ,binary=0,bits,i , x=1;
   Input "Enter a Number : " number
   bits=0
   i=number
   while (i>0)
   {
      binary=binary+(i%2)*x
      i=i/2
      x=x*10
      bits=bits+1
   }
   Print "bits required are",bits "\nbinary is :",binary
}
                                    END
```

Q#7:

Write pseudo code to do following:

a. Input a valid 6-digit binary number

b. Assume it as unsigned number, convert and print its decimal equivalent.

c. Assume it as signed number, convert and print its decimal equivalent.

Solution (a ,b):

```
   i=1,j,k=0, binary, decimal=0
   input "Enter a binary Number : ",binary
   j=binary
   while (i<=6)
   {
      if(j%10>1)
         k=k+1
      j=j/10
      i=i+1
   }
   if (k>0)
      Print  " It is not abinary Number"
   else if (j>0)
      Print " It exceeds limit "
   else
   {
      i=1,j=1
      while(j<=6)
      {
         decimal=decimal+(binary%10)*i;
         binary=binary/10;
         i=i*2
         j=j+1
      }
      Print decimal
   }
   Print "\n"
}
                                    END
```

Solution (A,C):

```
                                    START
   i,j, k=0,loop,binary,decimal=0
   Input "Enter 6 digit binary of a Number : ", binary
   i=1 ,j=binary
   while (i<=6)
   {
      if(j%10>1)
         k=k+1
         i=i+1
      j=j/10;
   }
   if (k>0)
      print "It is not a binary  Number "
   else if (j>0)
   print " It exceeds limit "
   else
   {
         loop=1 ,j=binary ,i=1
         while (j>0)
         {
            If (loop==6)
               decimal =decimal-(j%10)*i;
            else
               decimal =decimal+(j%10)*i;
            j=j/10;
            i=i*2;
            loop=loop+1
         }
         Print decimal
   }
   Print "\n"
                                    END
```