Northwestern Polytechnic University

CE450L Lab - Embedded Engineering Lab
Lab Assignment #4

Due day: 10/13/2021

Instruction:

1. **Push the source code to GitHub or answer sheet in word file**
2. **Please follow the code style rule like programs on handout.**
3. **Overdue homework submission could not be accepted.**
4. **Takes academic honesty and integrity seriously (Zero Tolerance of Cheating & Plagiarism)**

Objectives:
This exercise is to write programs to solve some interesting questions by logic operation, loops and conditional statements

The Laboratory Assignments:

- **Requirements:** write programs for the following questions, and then post them in Github including program description in header block comments area.

1. Swap two numbers without using third variable avoiding overflow issue

```c
#include <stdio.h>
void main()
{
    int a,b;
    printf("Enter Value of a= ");
    scanf("%d", &a);
    printf("\nEnter Value of b= ");
    scanf("%d", &b);
    int c = a;
    a = b;
    b = c;
    printf("\nSwap result: a = %d, b = %d", a, b);
    return 0;
    getch();
}
```

2. Reverse a given number and print it on the monitor

Output:
enter any no to get its reverse: 456

reverse=654

```c
#include<stdio.h>
 int main()
{
int n,num=0, a;
printf("Enter a number: ");
  scanf("%d", &n);
  while(n!=0)
  {
     a=n%10;
     num=num*10+a;
     n/=10;
  }
  printf("Reversed Number: %d",num);
return 0;
getch();
}
```

3. Find greatest in 3 numbers from keyboard input

Output:
enter value for a, b& c: 5 7 4

b is greatest

```c
#include <stdio.h>
int main()
{
 int a, b, c;

 printf("Please Enter diff values for a,b,c=");
 scanf("%d %d %d", &a, &b, &c);

 if (a > b && a > c)
  {
   printf("\n >>> a is greatest", a);
  }
 else if (b > a && b > c)
  {
   printf("\n>>> b is greatest", b);
  }
 else if (c > a && c > b)
  {
   printf("\n>>> c is greatest", c);
```

```c
    }
  else
    {
     printf("\n>>> all the three values or either two are
equal");
    }
  return 0;
}
```

4. Find that entered year is leap year or not

   [hint] In the Gregorian calendar three criteria must be taken into account to identify leap years:
   - The year can be evenly divided by 4;
   - If the year can be evenly divided by 100, it is NOT a leap year, unless;
   - The year is also evenly divisible by 400. Then it is a leap year.

```c
# include<stdio.h>
int main()
{
 int year;
 printf("please enter year=");
 scanf("%d",&year);
 if (year % 400 == 0)
   {
       printf("Yes %d  is a leap year !", year);
   }

   else if (year % 100 == 0)
   {
       printf("Oops!%d is not a leap year.", year);
   }

   else if (year % 4 == 0)
   {
       printf("Yes %d is a leap year!", year);
   }

   else {
       printf("Oops ! %d is not a leap year.", year);
   }

   return 0;
}
```

5. Find whether given number is even or odd from keyboard input

```
# include<stdio.h>
int main()
{
 int num;
 printf("please enter num=");
 scanf("%d",&num);
 if (num % 2 == 1)
  {
      printf(">>> %d  is an ODD number!",num) ;
   }
   else
   {
      printf(">>>%d is an Even number!", num);
   }
}
```

6. Shift input data by three bits to the left

   Output:

   Read the integer from keyboard: 2
   The left shifted data is = 16

```
#include<stdio.h>
int main()
{
int a, b;
printf("Enter integer=");
scanf("%d",&a);
a<<=3;
b=a;
printf("\nThe left shifted data is = %d ",b);
}
```

7. Use switch statement to display Monday to Sunday

   Output:

   enter m for Monday
   t for Tuesday
   w for Wednesday
   h for Thursday
   f for Friday

s for Saturday
u for Sunday: f
Friday

Notice that "f" is your input from keyboard

```c
#include<stdio.h>
int main()
{
char ch;
printf("enter\nm for Monday \nt for Tuesday\nw for
Wednesday\nh for Thursday\nf for Friday\ns for Saturday\nu
for Sunday \n");
printf(".............\n");
scanf("%c",&ch);

switch(ch)
{
case 'm':
case 'M':
    printf("monday \n");
break;
case 't':
case 'T':
printf("tuesday \n");
break;
case 'w':
case 'W':
    printf("wednesday \n");
break;
case 'h':
case 'H':
    printf("thursday \n");
break;
case 'f':
case 'F':
    printf("friday \n");
break;
case 's':
case 'S':
    printf("saturday \n");
break;
case 'u':
case 'U':
    printf("sunday \n");
break;
default:
    printf("wrong input \n");
break;
}
}
```

8. Display arithmetic operator using switch case.

Output:
enter two numbers: 8   4
enter 1 for sum
2 for multiply
3 for subtraction
4 for division: 1

sum=12

Notice that "1" is your input from keyboard

```c
#include<stdio.h>
int main()
{
int a,b;
int cal;
printf("Enter value of a and b = \n");
scanf("%d %d",&a,&b);
printf("_____\n");
printf("Enter :\n1 for sum\n2 for multiply\n3 for
subtraction\n4 for division\n");
printf("_____\n");
printf("=> ");
scanf("%d",&cal);
switch(cal)
{
case 1:
        printf("sum = %d",a,b,a+b);
break;
case 2:
        printf("mul = %d",a,b,a*b);
break;
case 3:
       printf("sub = %d",a,b,a-b);
break;
case 4:
        printf("div = %d",a,b,a/b);
break;
default:
        printf("wrong input \n");
break;
}
}
```

9. Input a number, such as n from keyboard and display their sum from 1 to n by using loops

Output:

enter a number: 10

sum = 55

notice that 55 = 1+2+3+4+5+6+7+8+9+10

```c
#include<stdio.h>
int main()
{
    int sum=0,i,n;
    printf("Enter the num = ");
    scanf ("%d",&n);
    for(i=1;i<=n;i++)
    {
        sum=i+sum;
    }
    printf("Sum = %d\n",sum);
     printf("Notice that ");
    printf("%d = ",sum);
     printf("1");
    for(i=2;i<=n;i++)

    {
        printf("+%d",i);
    }
    return 0;
}
```

10. Print stars as following sequence on the monitor by loops

```
      *
     ***
    *****
   *******
    *****
     ***
      *
```

```cpp
#include<iostream>
using namespace std;  //for cpp compiler only
int main()
{
int n, q, i, p;
```

```cpp
cout << "Enter number of rows: ";
cin >> n;
for(i = 1; i <= n; i++)
{
for(q = n; q >i; q--)
cout << " ";
for(p=1; p<i; p++)
cout << "* ";
cout << "\n";
}
for(i = 1; i < n; i++)
{
for(q = 1; q < i; q++)
cout << " ";
for(p = n; p > i; p--)
cout << "* ";
cout << "\n";
}
return 0;
}
```