Course Title:	Programming Fundamentals Lab (CL1002)
Assignment Title:	Lab Task (Manual 06, loops)
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Lab Manual 06

LAB TASKS [14 Marks]

1. Write a C program to calculate compound interest. An initial investment of $1,000 is made with a 5% annual interest rate, compounded annually. Your program should calculate and print the total amount in the account at the end of each year for 10 years.

2. Write a C program to predict population growth. Town A has a population of 10,000 and grows by 250 people per year. Town B has a population of 8,000 and grows by 400 people per year. Your program should determine after how many years Town B will surpass Town A in population and print the final populations of both towns for that year.

3. Write a C program to find numbers divisible by both 2nd last and last digit of your student ID. Your program should find and print the first 10 positive integers that are divisible by both 2nd last and last digit of your student ID.

4. Write a C program to calculate the factorial of a number. Your program should ask the user to enter the sum of your last two digits of your student ID as integer and then calculate and print its factorial. (Note: Factorial of 0 is 1).

5. Write a C program to calculate the sum of the last 4 digits of your student ID. Your program should ask the user to enter a positive integer and then calculate and print the sum of its digits. For example, if the input is 2038, the output should be 13 (2+0+3+8).

6. Write a C program to reverse the last 4 digits of your student ID. Your program should ask the user to enter a positive integer and then reverse its digits and print the result. For example, if the input is **2003**, the output should be **3002.**

7. Write a C program loop to calculate the power of a number. Your program should ask the user to enter a base and a non-negative exponent. Then, without using the **pow()** function, calculate the result of the base raised to the exponent and print it. For example, if the base is your **2nd last digit of student ID** and the exponent is **last digit of your student ID**.

Question 1

```c
#include<stdio.h>
#include<math.h>

int main(){

    int principal = 1000;
    float rate = 5;
    int year = 0;
    float amount;

    while (year < 10){
        year++;
        amount = principal * pow((1 + rate / 100), year);
        printf("\nYour amount after %d year will be %.2f.", year, amount);
    }

    return 0;
}
```

```
C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab ma...

Your amount after 1 year will be 1050.00.
Your amount after 2 year will be 1102.50.
Your amount after 3 year will be 1157.62.
Your amount after 4 year will be 1215.51.
Your amount after 5 year will be 1276.28.
Your amount after 6 year will be 1340.10.
Your amount after 7 year will be 1407.10.
Your amount after 8 year will be 1477.45.
Your amount after 9 year will be 1551.33.
Your amount after 10 year will be 1628.89.
--------------------------------
Process exited after 0.0633 seconds with return value 0
Press any key to continue . . .
```

```
Compi
Compilati
-------- 
- Errors:
- Warning
- Output
- Output
- Compila
```

Question 2

```c
#include<stdio.h>

int main(){

    int pop_a = 10000;
    int pop_b = 8000;
    int growth_a = 250;
    int growth_b = 400;
    int year;

    while (pop_b <= pop_a){
        pop_a += growth_a;
        pop_b += growth_b;
        year++;
    }

    printf("Population of town A = %d\nPopulation of town B = %d\nyear = %d.", pop_a, pop_b, year);

    return 0;
}
```

```
C:\Users\usman\OneDrive\Documents\PF LAB\q2\LAB MANUA...
Population of town A = 13500
Population of town B = 13600
year = 14.
--------------------------------
Process exited after 0.06695 seconds with return value 0
Press any key to continue . . .
```

Compile Log | Debug

```
Compilation results...
--------
```

Question 3

```c
#include<stdio.h>

int main(){

    int student_id = 2038;
    int last_digit, second_last_digit;
    int count = 1;
    int num = 1;


    last_digit = student_id % 10;
    second_last_digit = (student_id / 10) % 10;

    while ( count <= 10 ){
        if (num % last_digit == 0 && num % second_last_digit == 0){
        printf("%d) %d is divisible by both %d and %d.\n", count, num, last_digit, second_last_digit);
        count++;
        }
        num++;

    }
    return 0;
}
```

```
Select C:\Users\usman\OneDrive\Documents\PF LAB\q...
1) 24 is divisible by both 8 and 3.
2) 48 is divisible by both 8 and 3.
3) 72 is divisible by both 8 and 3.
4) 96 is divisible by both 8 and 3.
5) 120 is divisible by both 8 and 3.
6) 144 is divisible by both 8 and 3.
7) 168 is divisible by both 8 and 3.
8) 192 is divisible by both 8 and 3.
9) 216 is divisible by both 8 and 3.
10) 240 is divisible by both 8 and 3.

--------------------------------
Process exited after 0.05983 seconds with return value 0
```

```
Compile Log   Debug   F
ompilation results...
-------
 Errors: 0
 Warnings: 0
 Output Filename: C:\Users                                    .exe
 Output Size: 127.95703125
```

Question 4

```c
#include <stdio.h>

int main() {

    int student_id;
    int last_digit, second_last_digit;
    int sum, num, factorial = 1;

    printf("Enter your student ID:  ");
    scanf("%d", &student_id);

    last_digit = student_id % 10;
    second_last_digit = (student_id / 10) % 10;
    sum = last_digit + second_last_digit;

    for (num = 1; num <= sum; num++ ){
        factorial *= num;
    }

    printf("The factorial of %d is %d.", sum, factorial);


    return 0;
}
```

```
C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab...
Enter your student ID:  2038
The factorial of 11 is 39916800.
--------------------------------
Process exited after 3.882 seconds with return value 0
Press any key to continue . . .
```

Compile Log | Debug

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab munual 6 ques
- Output Size: 128.126953125 KiB
- Compilation Time: 0.24s
```

Question 5

```c
#include <stdio.h>

int main(){

    int id;
    int sum = 0;
    int x, i = 1;
    int digit;

    printf("Enter your student ID: ");
    scanf("%d", &id);

    for (i ; i <= 4; i++){
     digit = (id / x) % 10;
     sum += digit;
     x = x * 10;
    }

    printf("sum = %d.", sum);

    return 0;
}
```

```
C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab munual 6 que...
Enter your student ID: 2038
sum = 13.
--------------------------------
Process exited after 2.465 seconds with return value 0
Press any key to continue . . .
```

Compile

```
ompilatio
-------
 Errors:
 Warnings
 Output Filename: C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab munual 6 qu
 Output Size: 128.126953125 KiB
 Compilation Time: 0.23s
```

Question 6

```c

#include <stdio.h>

int main(){

    int id;
    int digit;
    int rev_num = 0;

    printf("Enter a positive 4 digit number: ");
    scanf("%d", &id);

    while (id != 0){
        digit = id % 10;
        id = id / 10;
        rev_num = rev_num * 10 + digit;
    }
    printf("%d", rev_num);


    return 0;
}

```

```
C:\Users\usman\OneDrive\Documents\PF LAB\q2\lab 6 q6.exe
Enter a positive 4 digit number: 2038
8302
--------------------------------
Process exited after 3.275 seconds with return value 0
Press any key to continue . . .
```

Compile Log Debu

```
ompilation results...
-------
 Errors: 0
```

Question 7

```c
#include<stdio.h>

int main(){

    int base, power;
    int i;
    int answer = 1;

    printf("Enter a base and a non-negative exponent: ");
    scanf("%d%d", &base, &power);

    for (i = 1; i <= power; i++ ){
        answer *= base;
    }

    printf("%d", answer);

    return 0;
}
```