Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

Fall 2024- 2025

Lab Guide #11 – Week 8 – 2

OBJECTIVES : Functions with Output Parameters and Exercises	
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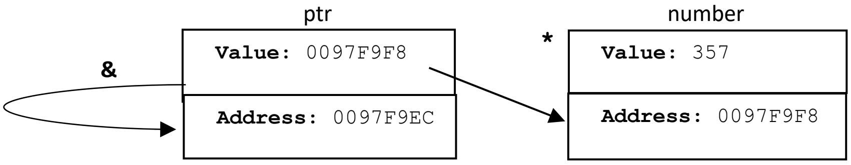
Q1. Fill in the blanks in the following C program using the given addresses and values of ptr and number variables. Then, write and execute it on your development environment and observe if all of the output is valid or not to correct your errors; addresses should look like hexadecimal numbers while values should look like decimal values.



```
#include <stdio.h>

int main (void)
{
   int number = 357;
   int *ptr;

   ptr = &number;

   printf("1.Value of the variable number by using number is : __\n", ___);
   printf("2.Value of the variable number by using ptr is : __\n", ___);

   printf("\n1.Address of the variable number by using number is : __\n", ___);
   printf("2.Address of the variable number by using ptr is : __\n", ___);

   printf("\n1.Address of the pointer ptr by using ptr is : __\n", ___);

   printf("\n1.Value of the pointer ptr by using ptr is : __\n", ___);

   *ptr = 711;

   printf("\n1.Value of the variable number by using number is : __\n", ___);
   printf("2.Value of the variable number by using ptr is : __\n", ___);

   return 0;
}
```

Project Name: LG11_Q1
File Name: Q1.cpp

Q2. Write a C program that gets a number representing the amount of days for this number in the units of days to be represented in years, months, and days respectively. Examine the example run below, carefully.

Write the following function;

- **convertDays:** that gets the value the user gave in units of days, in order to compute and *"return"* the respective values of years, months, and days.

Project Name: LG11_Q2
File Name: Q2.cpp

Hint: Assume that one year is 365 days, one month is 30 days.

Example Run:

```
Enter the number of days (-1 to stop): 3475
3475 days is 9 year(s), 6 month(s), 10 day(s)

Enter the number of days (-1 to stop): 365
365 days is 1 year(s), 0 month(s), 0 day(s)

Enter the number of days (-1 to stop): 48
48 days is 0 year(s), 1 month(s), 18 day(s)

Enter the number of days (-1 to stop): -1
```

Q3. Write a C program that gets real numbers from the user until the sentinel value -999 has been entered to divide each given number into its integral and fractional parts. It displays the sum of the integral and fractional parts as in the example run.

Write the following functions;

- **divideReal:** that gets a real number as a parameter and divides that into its integral and fractional parts, the function must, firstly, display and then, return these values via output parameters.
- **roundNum:** that gets the fractional part and the integral part as parameters to round it up or down depending on the fractional part of the given number and return the final result. In other words, if the fractional part is greater than or equal to 0.5, the integral part must be rounded up and down if the fractional part is less than 0.5.

Project Name: LG11_Q3
File Name: Q3.cpp

Example Run:

```
Enter a real number (-999 to stop): 698.32
The integral part: 698
The fractional part: 0.320000
The rounded number is 698

Enter a real number (-999 to stop): 854.9
The integral part: 854
The fractional part: 0.900000
The rounded number is 855

Enter a real number (-999 to stop): 478.67
The integral part: 478
The fractional part: 0.670000
The rounded number is 479

Enter a real number (-999 to stop): -999

Sum of the integral parts : 2030.000
Sum of the fractional parts : 1.890
```

Q4. Write a C program that gets the pairs of numbers from the user until the sentinel value of 0 is entered for either of them, to calculate and display their *least common multiplier* (**LCM**) and *greatest common divisor* (**GCD**).

Write the following function;

- **gcdLCM:** that gets two integral values for number 1 and number 2 to *return (via the usage of output parameters)* back the greatest common divisor and the least common multiplier for the given two numbers. The calculation of the least common multiplier can be found by using the following formula.

$$lcm = \frac{number1 * number2}{\text{gcd}}$$

Project Name: LG11_Q4
File Name: Q4.cpp

Example Run:

```
Enter a pair(0 to end): 1 19

1. pair : 1 19
GCD is 1
LCM is 19

Enter a pair(0 to end): 45 150

2. pair : 45 150
GCD is 15
LCM is 450

Enter a pair(0 to end): 12 49

3. pair : 12 49
GCD is 1
LCM is 588

Enter a pair(0 to end): 56 8

4. pair : 56 8
GCD is 8
LCM is 56

Enter a pair(0 to end): 0 12
```

ADDITIONAL QUESTIONS

AQ1.

In an ATM there are banknotes of 200, 100, 50, 20 and 10.

Write a C program that reads the money amount to be withdrawn from the user, and displays the banknote units on the screen. Withdrawal of an amount that is not a multiple of 10 TL is not allowed.

Write the following function;

- **`withdrawn`** that takes an amount of money to be withdrawn as an input parameter, and returns how many units of each banknote will be given to the user. For example: if she/he wants to withdraw 770 TL, ATM gives 3 units of 200 TL banknote, 1 unit of 100 TL banknote, 1 unit of 50 TL banknote, 1 unit of 20 TL banknote and 0 unit of 10 TL banknote.

Project Name: LG11_AQ1
File Name: AQ1.cpp

Example Run#1:

```
Enter the amount to be withdrawn: 865
865 TL cannot be given.
Money amount should be a multiple of 10 TL.

Enter the amount to be withdrawn: 860

For 860 TL, the ATM will give the following banknotes:
4 unit(s) of 200 TL
1 unit(s) of 50 TL
1 unit(s) of 10 TL
```

Example Run#2:

```
Enter the amount to be withdrawn (multiple of 10): 987
987 TL cannot be given.
Money amount should be a multiple of 10 TL.

Enter the amount to be withdrawn (multiple of 10): 990

For 990 TL, the ATM will give the following banknotes:
4 unit(s) of 200 TL
1 unit(s) of 100 TL
1 unit(s) of 50 TL
2 unit(s) of 20 TL
```

AQ2.

Write the following functions:

- **factorial**: that gets a number and returns its factorial,
- **permutation:** that gets two integer numbers, calculates the permutation according to the following formula, and returns the result (use the factorial function to get the factorials of the numbers),
- **combination:** that gets two integers and calculates the combination according to the following formula and returns the result (use permutation function and factorial function while calculating combination).

Write a program that calculates the permutation and combination of n items chosen k items at a time using the following formulas. The value of the n and k is specified by the user. Do not forget to make data validation.

HINT: n and k values must be: **n > 0, 0 < k <= n**

$$\textbf{P (n, k) =} \frac{n!}{(n-k)!} \qquad \textbf{C (n, k) =} \frac{P(n,k)}{k!}$$

Project Name: LG11_AQ2
File Name: AQ2.cpp

Example Run#1:

```
Enter n value: 0
Enter n value: -5
Enter n value: 6

Enter k value: -7
Enter k value: 9
Enter k value: 6

P(6, 6) = 720
C(6, 6) = 1
```

Example Run#2:

```
Enter n value: 10

Enter k value: 15
Enter k value: 7

P(10, 7) = 3628800
C(10, 7) = 720
```

Example Run#3:

```
Enter n value: 8

Enter k value: 4

P(8, 4) = 1680
C(8, 4) = 70
```