

DEPARTMENT OF COMPUTER ENGINEERING
CMPE112: Programming Fundamentals
EXPERIMENT 4

Introduction to C Programming: Functions

Objectives:

- 1) Understand how to edit, compile and execute C computer codes.
- 2) Understand C programming: Functions

Note: Before writing a computer code, you should do the following steps: 1) **understand** and **analyze** the problem, 2) develop an **algorithm** and/or **flowchart** and 3) convert the **algorithm** and/or the **flowchart** into a C **code**.

Task I: Trace section. What is the output of

```
A/ #include <stdio.h>
   int i=0; /* Global Variable */
   void f(void)
   { int i;
     i=1;
   }

   void g(void)
   { i=2;
   }
   void h(int i)
   { i=3;
   }

   int main(void)
   {
     { int i=4;
       printf("I1=%d \n",i);
     }
     printf("I2=%d \n",i);
     f();
     printf("I3=%d \n",i);
     g();
     printf("I4=%d \n",i);
     h(i);
     printf("I5=%d \n",i);
   }
   return 0;}

B/ #include <stdio.h>
   int f(int a) { return a%2 ? ++a : a--; }
   void main()
   { int i , a = 2;
     for (i = 0 ; i < 5 ; i++)
       { a += i;
         printf(" (%d,%d)" , i , f(a));
       }
   }
}
```

```

c/
#include<stdio.h>
void fun1(int a[], int length)
{int i;
for (i = 0; i<length; i++)
    a[i] = a[i] * a[i] -a[i];
length = 2 * length;
return;}

int main()
{int b[5] = {2, 3, 4, 5, 6};
fun1(b, b[1]);
for (i = 0; i<5; i++)
    printf("%d ", b[i]);
return 0;}

```

Task II: Programming

1) Write a C program which consist of a main function and two additional functions with the following prototypes:

```
float FindMaxA(float A[][4] , int k , int m);
```

```
int FindMaxB(int B[],int k);
```

where **FindMaxA** finds the greatest element in a 2-D 3X4 matrix **A** and **FindMaxB** finds greatest element in a 1-D 1x7 array **B**

In the main function, use the initialization {3.2, 5.8, 4.0, 0.0, 6.4, 10.5, -8.4, 6.5, -14.5, 5.6, 0.0, 7.2} for matrix **A**, and the initialization {88, 77, 12, 96, 51, 78, 12} for the array **B**.

2) The Fibonacci sequence is 0, 1, 1, 2, 3, 5, 8, 13, ..., where the first two terms are 0 and 1 and each term thereafter is defined recursively as the sum of the two preceding terms, i.e.,

Fib(n) = n for n < 2

Fib(n) = Fib (n-1) + Fib(n-2) for n >= 2

Write a recursive function that returns the nth number in a Fibonacci sequence. For example, when n=8, the function returns the 8th number in the sequence, which is 13. Re-write a function using repetition to calculate the nth term of a Fibonacci sequence.

3) It is required to calculate the letter grade of a student in CMPE112 course according to his total points as

80≤Total Point≤100	letter grade=A
70≤ Total Point <80	letter grade=B
60≤ Total Point <70	letter grade=C
50≤ Total Point <60	letter grade=D
Otherwise	letter grade=F

Write a computer code that will read the total point (**TotalPoint**) and then finds and prints the corresponding letter grade (**LetterGrade**). **Note:** Use a function subprogram to compute the letter grade, i.e., the function should receive the total point from the main program and it should return the letter grade to the main program. Use the following function prototype:
char LetterGradeComputation(int);

4) Write a menu driven program with the following choices for a sub-menu items:

Enter 1 to Convert from Celsius to Fahrenheit:

Enter 2 to convert from Fahrenheit to Celsius:

Use a function Celsius which returns Celsius equivalent of a Fahrenheit temperature.

$$C = (F - 32) \times \frac{5}{9}$$

Use a function Fahrenheit which returns Fahrenheit equivalent of a Celsius temperature.

$$F = \frac{9}{5} \times C + 32$$