

DEPARTMENT OF COMPUTER ENGINEERING
CMPE112: Programming Fundamentals
EXPERIMENT 6

Introduction to C Programming: Pointers

Objectives:

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

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 the following codes:

A/

```
#include <stdio.h>
main()
{
    int a[] = {13, 9, 11, 7, 3, 16, 2, 17};
    int k, *pa;
    pa = a + 1;
    for(k=0; *(pa+k)-2; k++)
        printf("\n a[%d] = %d", k, a[k]);
}
```

B/

```
#include <stdio.h>
main()
{
    void fun(int *);
    int k;
    int a[] = {9, 11, 7, 3, 16};
    fun(a + 2);
    for(k=0; k<5; k++) printf("%d  ", a[k]);
}
```

```
void fun(int *p)
{ p[-1] = p[p[-2] ? 2: 1];
  p[0] *= 2;
  p[1] = 44;
  p[2] = p[-1] + 1;
}
```

c/

```
#include <stdio.h>
double g(double u)
{
    return u < 0 ? u - 1 : u + 1;
}
```

```
void f(double *px)
{
    *px += g(*px);
}

void main()
{
    double y = 5.2;
    f(&y);
    printf("\n %4.1f" , y);
}
```

D/

```
#include <stdio.h>
main()
{
    int *ptr;
    int array[4] = {1, 2, 3, 4};
    for(ptr=array+3; ptr >= array; ptr--)
        printf("%d  ", *ptr);
}
```

E/

```
#include <stdio.h>
void fun(int *p)
{
    int i;
    i = 1;
    while( i < 10)
    {
        *p = i;
        i *= 3;
        p++;
    }
}

main()
{
    int a[] = {8, 2, 9, 4, 6, 5, 7};
    int i;
    fun(a+2);
    for(i=0; i < 7; i += 2)
        printf("%d  ", a[i]);
}
```

Task II: Programming

1/ Consider the following C-code that reads the radius of a circle and computes its area and circumference. A function with the prototype

```
void FindAreaCircum(double radius, double *area, double *circum);
```

is used to compute the area and the circumference by using pointer concept.

```
#include <stdio.h>  
void area_circum (double radius, double *area, double *circum);  
int main (void) {  
    double radius, a, c ;  
    printf ("Enter the radius of the circle > ") ;  
    scanf ("%lf", &radius) ;  
// function call  
    FindAreaCircum (radius, &a, &c) ;  
// displaying the values of area and circumference  
    printf("The area=%f and circumference is %f\n",a,c);  
    return 0;  
}  
void FindAreaCircum (double radius, double *area, double *circum)  
{  
    *area = 3.14 * radius * radius ;  
    *circum = 2 * 3.14 * radius ;  
}
```

A/ Edit this code and execute it for the input radius: 3.5

B/ Modify this code to compute the area and the volume of the a Box whose dimensions are Length, Width, and Height.

Use a separate function **FindAreaVol** with the prototype

```
void FindAreaVol(double len, double w, double h, double *A, double *Vol);
```

to compute the area and the volume.

2/ Write a code that will read two integer numbers and then call a function (swap) to interchange their values.

Use pointer concept and use the following function prototype:

```
void swap(int *x, int *y);
```

A sample run of the codes can be

```
Enter two numbers: 34 82
```

```
New swapped data are 82 34
```

3/ Write a C code that will read 10 numbers into an array, pass it to the function (max_min), and print the Largest and the Smallest elements. A sample run of the codes can be as

```
Enter 10 numbers: 34 82 49 102 7 94 23 11 50 31  
Largest: 102  
Smallest: 7
```

Use pointer concept and use the following function prototype:

```
void max_min(int *a, int n, int *max, int *min);
```