

Subject: PRF192- PFC

Workshop 04

Objectives:

- (1) Managing data using pointers
- (2) Developing programs using simple menus

Submission:

Please submit your work including a report and source code. All of them should be contained in a directory which is named as Workshop3_yourName_yourStudentID. Then zip this directory and submit.


The report MUST be a pdf file. Name of the file should contain your name and your student ID, such as Workshop3_yourName_yourStudentID.

The report must contain the pictures of all the test cases that you have done to test your programs.

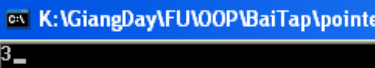
Part 1: Use notebook

Exercise 1 (1 mark) : Explain outputs:

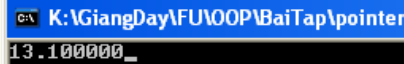
```
#include <stdio.h>
int main()
{
    int n=7, m=6;
    int*pn = &n;
    int*pm = &m;
    *pn = *pm + 2*m-3*n;
    *pm -= *pn;
    printf("%d", m+n);
    getchar();
    return 0;
}
```



```
#include <stdio.h>
int main()
{
    char c1='A', c2= 'F';
    char* p1= &c1;
    char* p2= &c2;
    *p1 += 3;
    *p2 -=5;
    printf("%d", c1-c2);
    getchar();
    return 0;
}
```



```
#include <stdio.h>
int main()
{
    double x= 3.2, y= 5.1;
    double* p1= &x;
    double* p2= &y;
    *p1 += 3 - 2*(*p2);
    *p2 -= 3*(*p1);
    printf("%lf", x+y);
    getchar();
    return 0;
}
```



Exercise 2: (1 marks) What are outputs

```
int n=7,m=8;
int* p1= &n, *p2=&m;
*p1 +=12-m+ (*p2);
*p2 = m + n- 2*(*p1);
printf("%d", m+n);
What is the output?
```

```
int n=7,m=8;
int* p1= &n, *p2=&m;
*p1 +=12-m+ (*p2);
*p2 = m + n- 2*(*p1);
printf("%d", m+n);
What is the output?
```

```
#include <stdio.h>
#include <conio.h>
main()
{ int n=260, *p=&n;
  printf("n=%d\n", n);
  char *pp=(char*)p;
  *pp=0;
  printf("n=%d\n", n);
  getch();
}
```

Exercise 3: (2 marks) Walkthroughs

•Study the following C-function:

```
int t (int x, int y, int z)
{ int k= 2*x + 3*y + 5*z;
  return k%13;
}
```

Suppose the above function is used in the following code:

```
int a=7, b=6, c=5;
int L= t(b,a,c);
```

What is the value of the L variable after this code is executed?

•Study the following C-function:

```
void T (int * p, int*q)
{ int t= *p; *p=*q; *q=t;
}
```

Suppose the above function is used in the following code:

```
int a=7, b=6;
T(&a,&b);
```

What are the values of the a and b variables after this code is executed?

•Study the following C-function:

```
int T (int * p, int*q)
{  int t= (*p) + (*q) > 12 ? 5:6;
  return 2*t%5;
}
```

Suppose the above function is used in the following code:

```
int a=3, b=4, c;
c= T(&a,&b);
```

What is the value of the C variable after this code is executed?

Part 2: Develop a program using simple menu

Program 1(3 marks):

Objectives	Practice implementing a program with simple menu.
Related knowledge	None
Problem	<p>Write a C program that will execute repetitively using a simple menu as following:</p> <ol style="list-style-type: none">1- Process primes2- Print min, max digit in an integer;3- Quit <p>Select an operation:</p> <ol style="list-style-type: none">1- When user selects the option 1, the program will accept a positive integral number and print out a message about whether the input number is a prime or not.2- When user selects the option 2, the program will accept a positive integral number and print out the minimum and maximum digit in this number.3- The program will terminate when user selects the option 3.
Analysis	<p><u>Nouns:</u></p> <ul style="list-style-type: none">- positive integral number → int n- A number represents a choice of user → int choice; <p><u>Functions:</u></p> <p>int prime(int n) → see above</p> <p>void printMinMaxDigits(int n) → see above</p>
Suggested algorithm (logical order of verbs)	<p>Begin</p> <pre>Do /* Print out the menu and get user choice*/ { Print out "1- Process primes\n"; Print out "2- Print min, max digit in an integer \n"; Print out "3- Quit\n"; Print out "Select an operation:"; switch(choice) { case 1: do { Input n; }</pre>

	<pre> while(n<0); If (prime(n)==1) Print " It is a prime\n"; Else Print " It is not a prime\n"; break; case 2: do { Input n; } while(n<0); printMinMaxDigits(int n) ; break; } } while (choice >0 & choice<3); End </pre>
--	--

```

57
58 int printMinMaxDigits(int n){
59     int digit; /* Variable for extracting 1 digit */
60     int min, max ; /* Result variables */
61     digit = n%10; /* get the first rightmost digit: 3 */
62     n/=10; /* 1029, the remainder needs to proceed after*/
63     min=max=digit; /* initialize results */
64     while (n>0){
65         digit = n%10; /* Get the next digit */
66         n/=10;
67         if (min > digit) min=digit; /* update results */
68         if (max < digit) max=digit;
69     }
70     printf("max and min digits are: %d and %d\n", max, min);
71     return 0;
72 }

```

Program 2(3 marks): (refer to the workshop 2 for algorithms)

Write a C program that will execute repetitively using a simple menu as following:

1-Fibonacci sequence

2-Check a date

3-Quit

Choose an operation:

- 1- When the option 1 is selected, the program will accept a positive integral number, called as n, then the first n Fibonacci numbers will be printed out
- 2- When the option 2 is selected, the program will accept a date then the program will tell that whether this data is valid or not.
- 3- If the option 3 is selected, the program quits

More Programs

You can pick 2 or 3 functions in the workshop 2, associate them to a new program.