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:

```c
#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;
}
```

```
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```

```c
#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;
}
```

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```

```c
#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;
}
```

```
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13.100000
```

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?
```

```c
#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	Write a C program that will execute repetitively using a simple menu as following: **1- Process primes** **2- Print min, max digit in an integer;** **3- Quit** **Select an operation:** 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	**Nouns:** - positive integral number → **int n** - A number represents a choice of user → **int choice;** **Functions**: **int prime(int n) → see above** **void printMinMaxDigits(int n) → see above**

Suggested algorithm (logical order of verbs)	Begin
	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;
	}

	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

```
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.