Experiment 10 Pointer (2)

1. Purpose of the experiment

(1) Further master the application of pointer.

(2) Be able to correctly use pointers to arrays and pointer variables to arrays.

(3) Can correctly use strings and pointers and pointer variables pointing to strings.

(4) Understand the use of pointers to pointers.

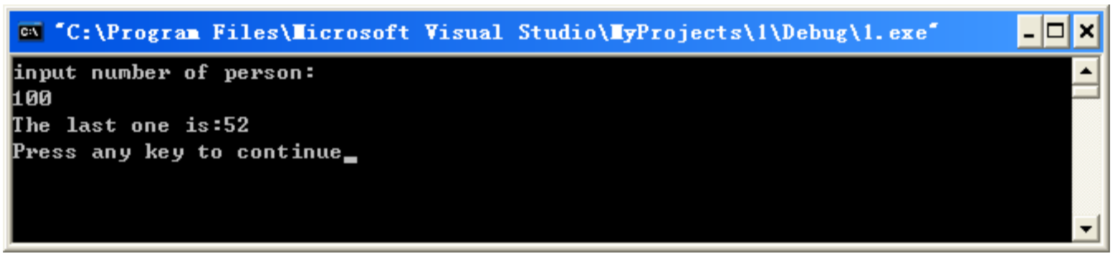
2. Experiment content

According to the requirements of the topic, write the program (requiring pointer processing), run the program, analyze the results, and conduct necessary discussion and analysis.

(1) There are n people in a circle and number them in order. Start counting from the first person (counting from 1 to 3). Those who report to 3 withdraw from the circle and ask what number they left last.

Code:

```
#include <stdio.h>
int main()
{
        int i,n,m,k,num[50],*p;
        printf("input number of person:\n");
        scanf("%d",&n);
        p=num;
        for(i=0;i<n;i++)
                *(p+i)=i+1;
        i=0;
        k=0;
        m=0;
        while(m<n-1)
        {
                if(*(p+i)!=0) k++;
                if(k==3)
                {
                        m++;
                        k=0;
                        *(p+i)=0;
                }
                i++;
                if(i==n) i=0;
        }
        while(*p==0) p++;
        printf("The last one is:%d\n",*p);
        return 0;
}
```



"C:\Program Files\Microsoft Visual Studio\MyProjects\1\Debug\1.exe"

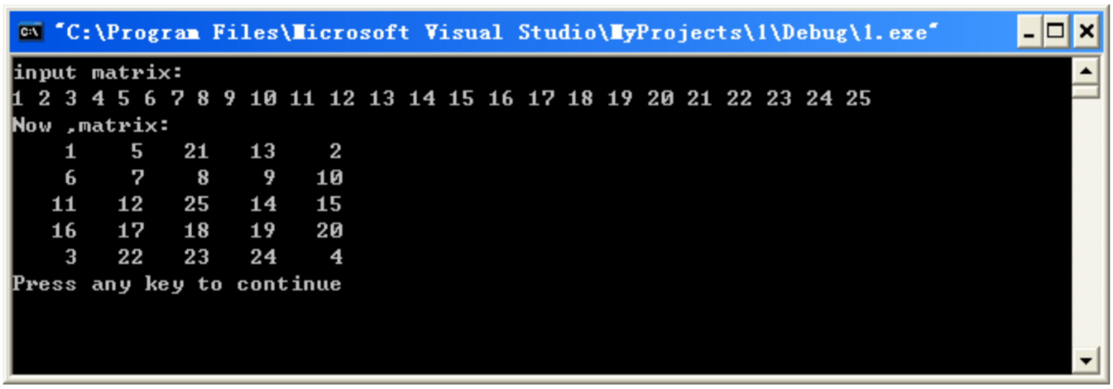
```
input number of person:
100
The last one is:52
Press any key to continue
```

(2) Put the largest element in a 5x5 matrix (two-dimensional array) in the center, and put the four smallest elements in the four corners (from left to right, from top to bottom, from small to large), and write a function to realize it. Call with the main function.

Code:

```
#include <stdio.h>
int main()
{
        void ch(int *p);
        int i,j,a[5][5],*p;
        printf("input matrix:\n");
        for(i=0;i<5;i++)
                for(j=0;j<5;j++)
                        scanf("%d",&a[i][j]);
        p=&a[0][0];
        ch(p);
        printf("Now ,matrix:\n");
        for(i=0;i<5;i++)
        {
                for(j=0;j<5;j++)
                        printf("%5d",a[i][j]);
                printf("\n");
        }
        return 0;
}
void ch(int *p)
{
        int i,j,temp;
        int *pmax,*pmin;
        pmax=p;
        pmin=p;
        for(i=0;i<5;i++)
                for(j=0;j<5;j++)
                {       if(*pmax<*(p+5*i+j)) pmax=p+5*i+j;
                        if(*pmin>*(p+5*i+j)) pmin=p+5*i+j;
                }
        temp=*(p+12);
        *(p+12)=*pmax;
```

```
    *pmax=temp;
    temp=*p;
    *p=*pmin;
    *pmin=temp;
    pmin=p+1;
    for(i=0;i<5;i++)
        for(j=0;j<5;j++)
            if(((p+5*i+j)!=p) && (*pmin>*(p+5*i+j)))
                pmin=p+5*i+j;
    temp=*(p+4);
    *(p+4)=*pmin;
    *pmin=temp;
    pmin=p+2;
    for(i=0;i<5;i++)
        for(j=0;j<5;j++)
            if(((p+5*i+j)!=p) && ((p+5*i+j)!=(p+4)) && (*pmin>*(p+5*i+j)))
                pmin=p+5*i+j;
    temp=*(p+20);
    *(p+20)=*pmin;
    *pmin=temp;
    pmin=p+3;
    for(i=0;i<5;i++)
        for(j=0;j<5;j++)
            if(((p+5*i+j)!=p) && ((p+5*i+j)!=(p+4)) && ((p+5*i+j)!=(p+20)) &&(*pmin>*(p+5*i+j)))
                pmin=p+5*i+j;
    temp=*(p+24);
    *(p+24)=*pmin;
    *pmin=temp;
}
```



"C:\Program Files\Microsoft Visual Studio\MyProjects\1\Debug\1.exe"

```
input matrix:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Now ,matrix:
    1    5   21   13    2
    6    7    8    9   10
   11   12   25   14   15
   16   17   18   19   20
    3   22   23   24    4
Press any key to continue
```

(3) There are four students and five courses in one class.

① Find the average score of the first course.

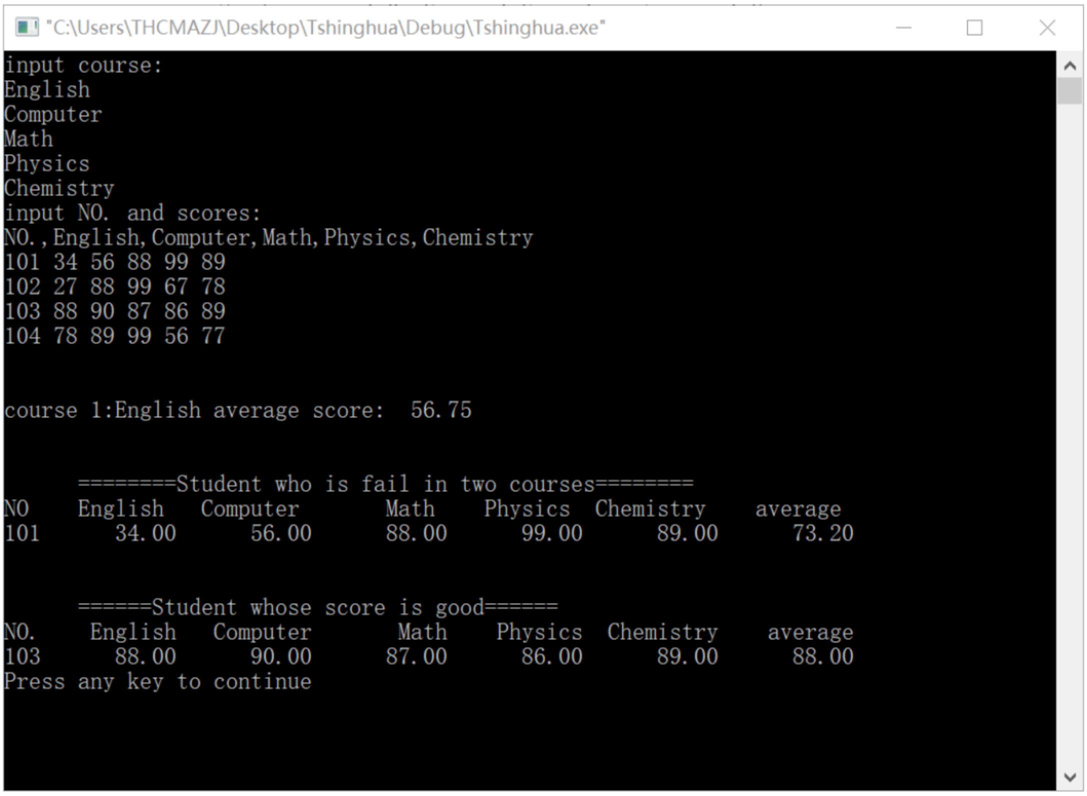
② Find out the students who fail in more than two courses, and output their student number, all course scores and average scores.

③ Find out the students with an average score of more than 90 or 85 in all courses. Compile three functions to realize the above three requirements.

Code:

```
#include <stdio.h>
int main()
{
	void avsco(float *,float *);
	void avcour1(char(*)[10],float *);
	void fali2(char course[5][10],int num[],float *pscore,float aver[4]);
	void good(char course[5][10],int mun[4],float *pscore,float aver[4]);
	int i,j,*pnum,num[4];
	float score[4][5],aver[4],*pscore,*paver;
	char course[5][10],(*pcourse)[10];
	printf("input course:\n");
	pcourse=course;
	for (i=0;i<5;i++)
		scanf("%s",course[i]);
	printf("input NO. and scores:\n");
	printf("NO.");
	for(i=0;i<5;i++)
		printf(",%s",course[i]);
	printf("\n");
	pscore=&score[0][0];
	pnum=&num[0];
	for(i=0;i<4;i++)
	{
		scanf("%d",pnum+i);
		for(j=0;j<5;j++)
			scanf("%f",pscore+5*i+j);
	}
	paver=&aver[0];
	printf("\n\n");
	avsco(pscore,paver);
	avcour1(pcourse,pscore);
	printf("\n\n");
	fali2(pcourse,pnum,pscore,paver);
	printf("\n\n");
	good(pcourse,pnum,pscore,paver);
	return 0;
}

void avsco(float *pscore,float *paver)
```

```
{
    int i,j;
    float sum,average;
    for(i=0;i<4;i++)
    {
        sum=0.0;
        for(j=0;j<5;j++)
            sum=sum+(*(pscore+5*i+j));
        average=sum/5;
        *(paver+i)=average;
    }
}
void avcour1(char(*pcourse)[10],float *pscore)
{
    int i;
    float sum,average1;
    sum=0.0;
    for(i=0;i<4;i++)
        sum=sum+(*(pscore+5*i));
    average1=sum/4;
    printf("course 1:%s average score:%7.2f\n",*pcourse,average1);
}

void fali2(char course[5][10],int num[],float *pscore,float aver[4])
{
    int i,j,k,lable;
    printf("          ========Student who is fail in two courses========\n");
    printf("NO");
    for(i=0;i<5;i++)
        printf("%11s",course[i]);
    printf("       average\n");
    for(i=0;i<4;i++)
    {
        lable=0;
        for(j=0;j<5;j++)
            if(*(pscore+5*i+j)<60.0) lable++;
        if(lable>=2)
        {
            printf("%d",num[i]);
            for(k=0;k<5;k++)
                printf("%11.2f",*(pscore+5*i+k));
            printf("%11.2f\n",aver[i]);
        }
    }
}

void good(char course[5][10],int num[4],float *pscore,float aver[4])
{
	int i,j,k,n;
	printf("        ======Student whose score is good======\n");
	printf("NO.");
	for(i=0;i<5;i++)
		printf("%11s",course[i]);
	printf("      average\n");
	for(i=0;i<4;i++)
	{
		n=0;
		for(j=0;j<5;j++)
			if (*(pscore+5*i+j)>85.0)    n++;
		if((n==5)||(aver[i]>=90))
		{
			printf("%d",num[i]);
			for(k=0;k<5;k++)
				printf("%11.2f",*(pscore+5*i+k));
			printf("%11.2f\n",aver[i]);
		}
	}
}
```

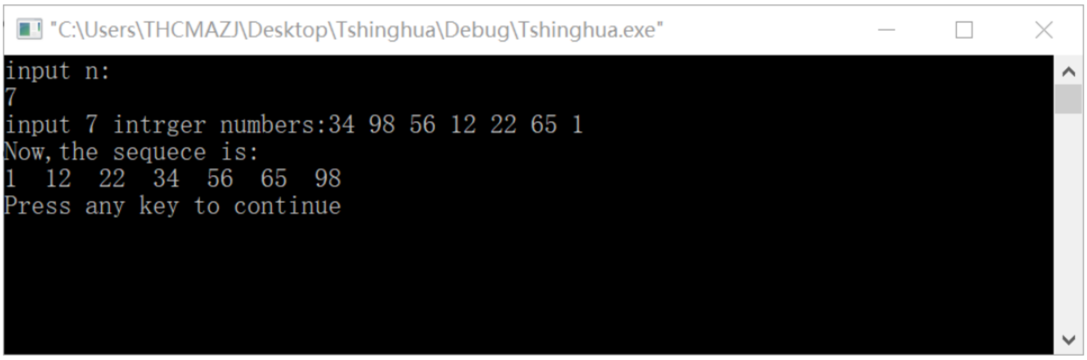


```
input course:
English
Computer
Math
Physics
Chemistry
input NO. and scores:
NO.,English,Computer,Math,Physics,Chemistry
101 34 56 88 99 89
102 27 88 99 67 78
103 88 90 87 86 89
104 78 89 99 56 77


course 1:English average score:  56.75


      ========Student who is fail in two courses========
NO    English   Computer       Math    Physics  Chemistry    average
101      34.00      56.00      88.00      99.00      89.00      73.20


      ======Student whose score is good======
NO.    English   Computer       Math    Physics  Chemistry    average
103      88.00      90.00      87.00      86.00      89.00      88.00
Press any key to continue
```

(4)Sorts n strings and outputs them using the method of pointer to pointer. The sorting is required to be written as a function separately. N and all integers are entered in the main function. Finally, output in the main function.

Code:

```
#include <stdio.h>
int main()
{
    void sort(int **p,int n);
    int i,n,data[20],**p,*pstr[20];
    printf("input n:\n");
    scanf("%d",&n);
    for(i=0;i<n;i++)
        pstr[i]=&data[i];
    printf("input %d intrger numbers:",n);
    for(i=0;i<n;i++)
        scanf("%d",pstr[i]);
    p=pstr;
    sort(p,n);
    printf("Now,the sequece is:\n");
    for(i=0;i<n;i++)
        printf("%d    ",*pstr[i]);
    printf("\n");
    return 0;
}

void sort(int **p,int n)
{
    int i,j,*temp;
    for(i=0;i<n-1;i++)
    {
        for(j=i+1;j<n;j++)
        {
            if(**(p+i)>**(p+j))
            {
                temp=*(p+i);
                *(p+i)=*(p+j);
                *(p+j)=temp;
            }
        }
    }
}
```



```
input n:
7
input 7 intrger numbers:34 98 56 12 22 65 1
Now,the sequece is:
1  12  22  34  56  65  98
Press any key to continue
```