

实验九 数组（1）

一、实验目的

1. 掌握一维数组和二维数组的定义、赋值和输出的方法；
2. 掌握与数组有关的算法。

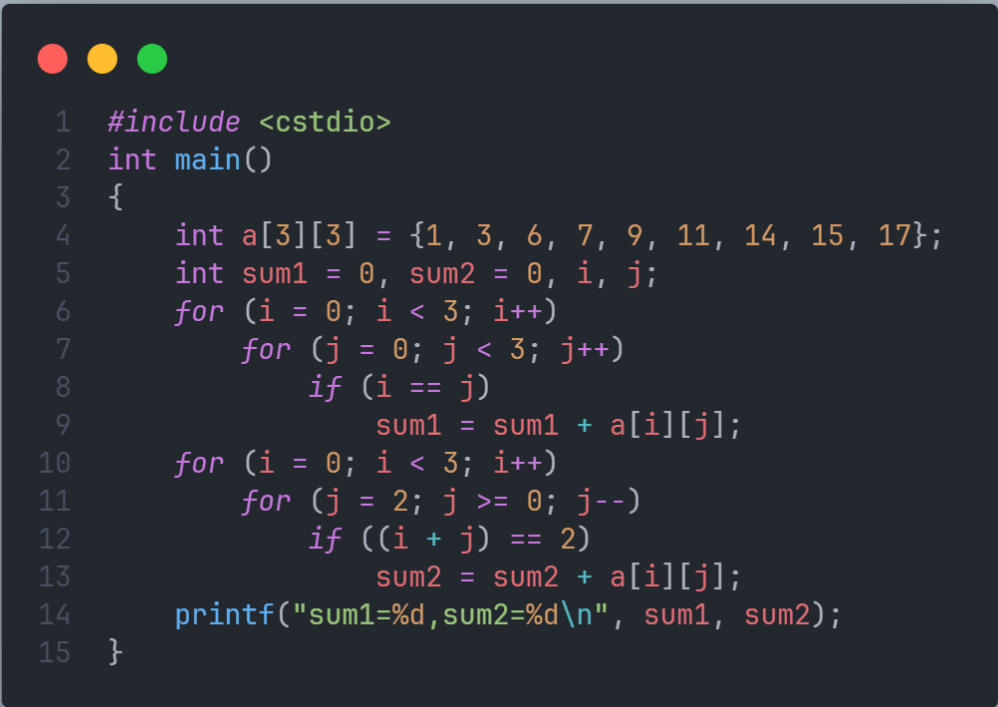
三、实验内容

➤ 基本题

(一)完善程序（对每处填空分别作出必要的注释）

- 1、求矩阵 a 的两条对角线上的元素之和。

```
main()  
{  
    int a[3][3]={1,3,6,7,9,11,14,15,17};  
    int sum1=0, sum2=0,i,j;  
    for (i=0;i<3;i++)  
        for (j=0;j<3;j++)  
            if(i==j) sum1=sum1+a[i][j];  
    for (i=0;i<3;i++)  
        for (_____;_____;j--)  
            if( (i+j)==2) sum2=sum2+a[i][j];  
    printf("sum1=%d,sum2=%d\n",sum1,sum2);  
}
```



```
1  #include <stdio.h>  
2  int main()  
3  {  
4      int a[3][3] = {1, 3, 6, 7, 9, 11, 14, 15, 17};  
5      int sum1 = 0, sum2 = 0, i, j;  
6      for (i = 0; i < 3; i++)  
7          for (j = 0; j < 3; j++)  
8              if (i == j)  
9                  sum1 = sum1 + a[i][j];  
10     for (i = 0; i < 3; i++)  
11         for (j = 2; j >= 0; j--)  
12             if ((i + j) == 2)  
13                 sum2 = sum2 + a[i][j];  
14     printf("sum1=%d,sum2=%d\n", sum1, sum2);  
15 }
```

```
Meow! What should I do next? ... c learning 10:43
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.e
xe' '--stdin=Microsoft-MIEngine-In-pbz3xgsy.5dw' '--stdout=Microsoft-MIEngine-Out-plpl13b3.jsf' '--stderr=Microsoft-MIEng
ine-Error-dennwnf5.wtl' '--pid=Microsoft-MIEngine-Pid-vcg3g3hf.gtz' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.ex
e' '--interpreter=mi'
sum1=27,sum2=29
```

2、将十进制整数转换成 n 进制。

```
main()
{
    int i=0,base,n,____,num[20];
    printf("Enter data that will be converted\n");
    scanf("%d",&n);
    printf("Enter base\n");
    scanf("%d",&base);
    do
    {
        i++;num[i]=____;
        n=____;
    } while (n!=0);
    printf("The data %d has been converted into the %d ——base
data:\n",n,base);
    for (____)
        printf("    %d",num[j]);
}
```

```
1 #include <stdio>
2 int main()
3 {
4     int i = 0, base, n, j = 0, num[20] = {0};
5     printf("Enter data that will be converted\n");
6     scanf("%d", &n);
7     printf("Enter base\n");
8     scanf("%d", &base);
9     do
10    {
11        i++;
12        num[i-1] = n % base;
13        n = n / base;
14    } while (n != 0);
15    printf("The data %d has been converted into the %d ——base data:\n", n, base);
16    for (j = i-1; j >= 0; j--)
17        printf("%d", num[j]);
18 }
```

```
Meow! What should I do next? ... c learning 10:43
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.e
xe' '--stdin=Microsoft-MIEngine-In-oajbw15i.wne' '--stdout=Microsoft-MIEngine-Out-0wvyjbkh.33v' '--stderr=Microsoft-MIEng
ine-Error-vet3sum4.g41' '--pid=Microsoft-MIEngine-Pid-pad5alug.nw2' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.ex
e' '--interpreter=mi'
Enter data that will be converted
80
Enter base
2
The data 80 has been converted into the 2 ——base data:
1010000
```

(二) 运行程序，输出结果。

1、main()

```
{int i, f[10];
```

```

f[0]=f[1]=f[2]=1;
for(i=3;i<10;i++)
    f[i]=f[i-1]+f[i-2]+f[i-3];
for (i=0;i<10;i++)
    {if (i%4==0) printf("\n");
    printf("%3d",f[i]);
    }
}

```

输出结果:

```

c learning 10:45
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-In-gvjm3due.sg5' '--stdout=Microsoft-MIEngine-Out-ffpxdxuw.3is' '--stderr=Microsoft-MIEngine-Error-cajwltw.mfn' '--pid=Microsoft-MIEngine-Pid-lxy2lyh.r2v' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'

1 1 1 3
5 9 17 31
57105

```

2、main()

```

{int a[10]={1,2,2,3,4,3,4,5,1,5};
int n=0,i,j,c,k;
for (i=0;i<10-n;i++)
    {c=a[i];
    for (j=i+1;j<10-n;j++)
        if (a[j]==c)
            {for (k=j;k<10-n;k++)
                a[k]=a[k+1]; n++;
            }
    }
for (i=0;i<(10-n);i++)
    printf ("%d",a[i]);
printf ("\n");
}

```

输出结果:

```

c learning 10:47
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-In-t2koyrm5.udx' '--stdout=Microsoft-MIEngine-Out-305i5wub.hgg' '--stderr=Microsoft-MIEngine-Error-j0s2i1xu.dka' '--pid=Microsoft-MIEngine-Pid-o10f15un.xss' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'

12345

```

3、main()

```

{int i,j,row,col,min;
int a[3][4]={ {1,2,3,4},{9,8,7,6},{-1,-2,0,5}};
min=a[0][0];
for (i=0;i<3;i++)
    for (j=0;j<4;j++)
        if (a[i][j]<min)
            {min=a[i][j];row=i;col=j;}
printf ("min=%d,row=%d,col=%d\n",min,row,col);
}

```

输出结果:

```
PROBLEMS  TERMINAL  OUTPUT  PORTS  SERIAL MONITOR  DEBUG CONSOLE  cppdbg: 5.exe + v [ ] [ ] ... ^
Meow! What should I do next? ...  c learning 10:48
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.e
xe' '--stdin=Microsoft-MIEngine-In-wqvnv4a0.1jp' '--stdout=Microsoft-MIEngine-Out-usjdwv0.21w' '--stderr=Microsoft-MIEng
ine-Error-qhbd1bs4.xjx' '--pid=Microsoft-MIEngine-Pid-dkz2sh0b.0mu' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.ex
e' '--interpreter=mi'
min=-2,row =2,col=1
```

(三)编程题

1、找出方阵中每列中的最小元素及其所在的行号，并将这些最小元素中的最大值与最小值及其行列号输出。

```
1  #include <iostream>
2  #include <cmath>
3  #include <cstring>
4  // #include <cstdlib>
5  int main()
6  {
7      int n = 0;
8      std::cin >> n;
9      int min_list[n][3], min = 0, max = 0, min_row = 0, min_col = 0, max_row = 0, max_col = 0;
10     int i = 0, j = 0;
11     int tmp_list[3] = {0, 0, 0};
12     int cur = 0;
13     memset(min_list, {0x3f3f3f3f}, sizeof(min_list));
14     for (int i = 0; i < n; i++)
15     {
16         for (int j = 0; j < n; j++)
17         {
18             std::cin >> cur;
19             if (min_list[i][0] > cur)
20             {
21                 min_list[i][0] = cur;
22                 min_list[i][1] = i;
23                 min_list[i][2] = j;
24             }
25         }
26         std::cout<<i<<std::endl;
27     }
28     min = max = min_list[0][0];
29     for (int i = 0; i < n; i++)
30     {
31         if (min_list[i][0] >= max)
32         {
33             max = min_list[i][0];
34             max_row = min_list[i][1];
35             max_col = min_list[i][2];
36         }
37         if (min_list[i][0] <= min)
38         {
39             min = min_list[i][0];
40             min_row = min_list[i][1];
41             min_col = min_list[i][2];
42         }
43     }
44     std::cout << "min=" << min << ",row=" << min_row << ",col=" << min_col << std::endl;
45     std::cout << "max=" << max << ",row=" << max_row << ",col=" << max_col << std::endl;
46 }
```

```
Meow! What should I do next? ... c learning 11:24
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-In-eq5t3dxd.1bd' '--stdout=Microsoft-MIEngine-Out-epy44ilv.tb2' '--stderr=Microsoft-MIEngine-Error-fx5uzyke.54v' '--pid=Microsoft-MIEngine-Pid-nfyc23qg.ble' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
3
1 2 3
0
4 5 6
1
7 8 9
2
min=1,row=0,col=0
max=7,row=2,col=0
```

2、已知一维数 a 中存放几个数据，试将下标为 $\text{int}(n/3)$ 到 $\text{int}(n/2)$ 元素删除。

```
1  #include <iostream>
2  #include <vector>
3  using namespace std;
4  int main()
5  {
6      int tmp = 0;
7      vector<int> a;
8      for(int i = 0; i < 10; i++)
9      {
10         cin>>tmp;
11         a.push_back(tmp);
12     }
13     int n = 0;
14     cin>>n;
15     tmp = (int)(n/3)-1;
16     for(int i = (int)(n/3)-1; i <= (int)(n/2)-1; i++)
17     {
18         a.erase(a.begin() + tmp);
19     }
20     for(int i = 0; i < a.size(); i++)
21     {
22         cout<<a[i]<<" ";
23     }
24 }
```

```
Meow! What should I do next? ... c learning 11:40
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-In-tfm0fat1.t5f' '--stdout=Microsoft-MIEngine-Out-1vla1vxz.zwm' '--stderr=Microsoft-MIEngine-Error-emxzlkn3.k35' '--pid=Microsoft-MIEngine-Pid-ihznwvr.eil' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
1 2 3 4 5 6 7 8 9 10
6
1 4 5 6 7 8 9 10
```

3、随机产生 15 个互不重复的介于 0~19 之间的随机整数存入数组中。

调用随机函数的步骤如下：（假设 $\text{int } x$ ）

```
#include "stdlib.h"
x=rand ( ) %20    (*产生 0~19 的随机数*)
```

```
1  #include <iostream>
2  #include <cstdlib>
3  #include <ctime>
4  int main()
5  {   srand(time(NULL));
6      int a[15] = {0};
7      for (int i = 0;i<15;++i)
8      {
9          a[i] = rand()%20;
10         std::cout<<a[i]<<" ";
11     }
12     std::cout<<std::endl;
13 }
```

```
Meow! What should I do next? ... c learning 11:44
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.
exe' '--stdin=Microsoft-MIEngine-In-byt05mbs.vb0' '--stdout=Microsoft-MIEngine-Out-vdfmgjqt.0dg' '--stderr=Microsoft-MIE
ngine-Error-j03es0qp.sy4' '--pid=Microsoft-MIEngine-Pid-zmlp33gh.fvk' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb
.exe' '--interpreter=mi'
6 9 9 6 8 8 17 13 3 16 8 9 0 11 16
```

四、课后作业

撰写实验报告。

五、实验机时

2 机时。