

Assignment5

Q1

Description

Write a C program that declares three one-dimensional arrays named *price*, *quantity*, and *amount*. Each array should be capable of holding 10 elements. Using a for loop, input values for the price and quantity arrays. The entries in the amount array should be product of the corresponding values in the price and quantity arrays (thus, $\text{amount}[i] = \text{price}[i] * \text{quantity}[i]$). After all of the data has been entered, display the following output:

Code

```
#define MAXN 10
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include "judge.h"

int main() {
    double price[MAXN], amount[MAXN], quantity[MAXN];
    char s[MAXN];
    int n;
    int i;

    printf("Please input the number of items.");
    n = judgeIfANumber("int");
    for(i = 0; i < n; i++) {
        printf("Please input the price of no.%d item.", i+1);
        price[i] = judgeIfANumber("float");
        printf("Please input the quantity of no.%d item.", i+1);
        quantity[i] = judgeIfANumber("float");
        amount[i] = price[i] * quantity[i];
    }
    printf("\nQuantity\tPrice\tAmount\n-----\t-----\t-----\n");
    for(i = 0; i < n; i++)
        printf("%8.2f\t%5.2f\t%6.2f\t\n", quantity[i], price[i], amount[i]);
    return 0;
}
```

Input

```
3
2
1
3.5
4
6.9
5
```

Output

```
Please input the number of items.3
Please input the price of no.1 item.2
Please input the quantity of no.1 item.1
Please input the price of no.2 item.3.5
Please input the quantity of no.2 item.4
Please input the price of no.3 item.6.9
Please input the quantity of no.3 item.5
```

Quantity	Price	Amount
1.00	2.00	2.00
4.00	3.50	14.00
5.00	6.90	34.50

Q2

Description

Write a C program that includes two functions named `calcAvg()` and `variance()`. The `calcAvg()` function should calculate and return the average of the values stored in an array named `testvals`. The array should be declared in `main()` and include the values 89,95,72,83,99,54,86,75,92,73,79,75,82,73. The `variance()` function should calculate and return variance of the data. The variance is obtained by subtracting the average from each value in `testvals`, squaring the difference obtained, adding their squares, and dividing by the number of elements in `testvals`. the values returned from `calcAvg()` and `variance()` should be displayed using `printf()` function calls in `main()`.

Code

```
#include<stdio.h>

double calcAvg(int* testvals,int size){
    int i;
    double avg=0.0;
    for(i=0;i<size;i++){
```

```

        avg+=testvals[i];
    }
    avg=avg/size;
    return avg;
}

double variance(int* testvals,int size,double avg){
    int i;
    double var=0.0;
    for(i=0;i<size;i++){
        var+=(testvals[i]-avg)*(testvals[i]-avg);
    }
    var=var/size;
    return var;
}

int main(){
    int testvals[]={89,95,72,83,99,54,86,75,92,73,79,75,82,73};
    double avg=0;
    double var=0;
    avg=calcAvg(testvals,14);
    var=variance(testvals,14,avg);
    printf("%.3lf , %.3lf",avg,var);
}

```

Input

No input.

Output

```
80.500 , 124.679
```

Q3

Description

For the function `bubbleSort()`, the sorting can be done in decreasing order by a simple modification. In each case identify the required changes and then rewrite the function to accept a flag indicating whether the sort should be in increasing or decreasing order. Modify the routine to receive and use this flag argument correctly.

Code

```

#define MAXN 10
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include "judge.h"

void swap(int *a, int *b) {
    int temp = *b;
    *b = *a;
    *a = temp;
}

void bubbleSort(int target[], int flag, int n) {
    int i, j;
    for(i = 0; i < n; i++) {
        for(j = i+1; j < n; j++) {
            if(flag == 1) {
                if(target[i] > target[j]) {
                    swap(&target[i], &target[j]);
                }
            }
            else {
                if(target[i] < target[j]) {
                    swap(&target[i], &target[j]);
                }
            }
        }
    }
}

void selectionSort(int target[], int flag, int n) {
    int i, j, extre;
    for(i = 0; i < n; i++) {
        extre = target[i];
        for(j = i+1; j < n; j++) {
            if(flag == 1) {
                if(target[j] < extre) {
                    swap(&target[j], &extre);
                }
            }
            else {
                if(target[j] > extre) {
                    swap(&target[j], &extre);
                }
            }
        }
        target[i] = extre;
    }
}

int main() {
    int a[MAXN], b[MAXN];

```

```

int n;
int i, j, k;
int flag;

printf("Please input the number of the numbers: ");
n = judgeIfANumber("int");
printf("Please input the order, 1 for ascending, 2 for descending: ");
flag = judgeIfANumber("int");

printf("Please input the numbers: ");
for(i = 0; i < n; i++) {
    a[i] = judgeIfANumber("int");
    b[i] = a[i];
}

bubbleSort(a, flag, n);
printf("After bubble sort, the array seems like: \n");
for(i = 0; i < n; i++) {
    printf("%d\n", a[i]);
}

selectionSort(b, flag, n);
printf("\nAfter selection sort, the array seems like: \n");
for(i = 0; i < n; i++) {
    printf("%d\n", b[i]);
}

getchar();getchar();
return 0;
}

```

Input

```

2
6
9
7
8

```

Output

```

Please input the number of the numbers: 5
Please input the order, 1 for ascending, 2 for descending: 1
Please input the numbers: 2
6

```

```
9
7
8
After bubble sort, the array seems like:
```

```
2
6
7
8
9
```

After selection sort, the array seems like:

```
2
6
7
8
9
```

Q4

Description

Calculate the average grade of each student.

Code

```
#define MAXN 10
#define COURSEN 4
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include "judge.h"

int main() {
    float grade[MAXN][COURSESEN+1];
    float course[COURSESEN];
    char *numbers[] = {"first", "second", "third", "fourth"};

    int i, j, k;
    for(i = 0; i < COURSEN; i++)
        course[i] = 0;

    for(i = 0; i < MAXN; i++){
        printf("Please input no.%d student's grades.\n", i+1);
        grade[i][COURSESEN] = 0;
        for(j = 0; j < COURSEN; j++) {
            printf("Please input the grade of %s class.", numbers[j]);
            grade[i][j] = judgeIfANumber("float");
```

```

        grade[i][COURSEN] += grade[i][j];
        course[j] += grade[i][j];
    }
    grade[i][COURSEN] /= COURSEN;
}
printf("\nCourse 1\tCourse 2\tCourse 3\tCourse 4\tAverage\n");
printf("-----\t-----\t-----\t-----\t-----\n");
for(i = 0; i < MAXN; i++){
    for(j = 0; j < COURSEN; j++) {
        printf("%8.2f\t", grade[i][j]);
    }
    printf("%8.2f\n", grade[i][COURSEN]);
}
for(i = 0; i < COURSEN; i++){
    printf("%8.2f\t", course[i]/COURSEN);
}
getchar();getchar();
return 0;
}

```

Input

```

50 60 40 60
50 67 80 90
40 50 65 63
65 13 34 50
60 90 10 50
60 10 60 20
30 50 60 70
90 60 50 60
68 65 63 98
96 69 95 92

```

Output

```

Please input no.1 student's grades.
Please input the grade of first class.50
Please input the grade of second class.60
Please input the grade of third class.40
Please input the grade of fourth class.60
Please input no.2 student's grades.
Please input the grade of first class.50
Please input the grade of second class.67
Please input the grade of third class.80
Please input the grade of fourth class.90
Please input no.3 student's grades.
Please input the grade of first class.40

```

Please input the grade of second class.50
Please input the grade of third class.65
Please input the grade of fourth class.63
Please input no.4 student's grades.
Please input the grade of first class.65
Please input the grade of second class.13
Please input the grade of third class.34
Please input the grade of fourth class.50
Please input no.5 student's grades.
Please input the grade of first class.60
Please input the grade of second class.90
Please input the grade of third class.10
Please input the grade of fourth class.50
Please input no.6 student's grades.
Please input the grade of first class.60
Please input the grade of second class.10
Please input the grade of third class.60
Please input the grade of fourth class.20
Please input no.7 student's grades.
Please input the grade of first class.30
Please input the grade of second class.50
Please input the grade of third class.60
Please input the grade of fourth class.70
Please input no.8 student's grades.
Please input the grade of first class.90
Please input the grade of second class.60
Please input the grade of third class.50
Please input the grade of fourth class.60
Please input no.9 student's grades.
Please input the grade of first class.68
Please input the grade of second class.65
Please input the grade of third class.63
Please input the grade of fourth class.98
Please input no.10 student's grades.
Please input the grade of first class.96
Please input the grade of second class.69
Please input the grade of third class.95
Please input the grade of fourth class.92

Course 1	Course 2	Course 3	Course 4	Average
-----	-----	-----	-----	-----
50.00	60.00	40.00	60.00	52.50
50.00	67.00	80.00	90.00	71.75
40.00	50.00	65.00	63.00	54.50
65.00	13.00	34.00	50.00	40.50
60.00	90.00	10.00	50.00	52.50
60.00	10.00	60.00	20.00	37.50
30.00	50.00	60.00	70.00	52.50
90.00	60.00	50.00	60.00	65.00

68.00	65.00	63.00	98.00	73.50
96.00	69.00	95.00	92.00	88.00
60.90	53.40	55.70	65.30	

Q5

Description

Calculate the sales of a supermarket.

Code

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
int main() {
    int a[4][3] = {{90, 127, 86}, {94, 120, 90}, {120, 125, 95}, {117, 130, 80}};
    int b[3] = {2200, 1900, 1300};
    int c[4];
    int i, j, k;
    for(i = 0; i < 4; i++) {
        c[i] = 0;
        for(j = 0; j < 3; j++) {
            c[i] += a[i][j] * b[j];
        }
    }
    printf("The sales of the supermarket: \n");
    for(i = 0; i < 4; i++) {
        printf("Season %d: %d\n", i+1, c[i]);
    }
    test();
    return 0;
}
```

Input

No input.

Output

```
The sales of the supermarket:
Season 1: 551100
Season 2: 551800
Season 3: 625000
Season 4: 608400
```

