1. Demonstrate you successfully followed the steps in this lab by preparing screen captures of you running the lab as specified in the Instructions above.

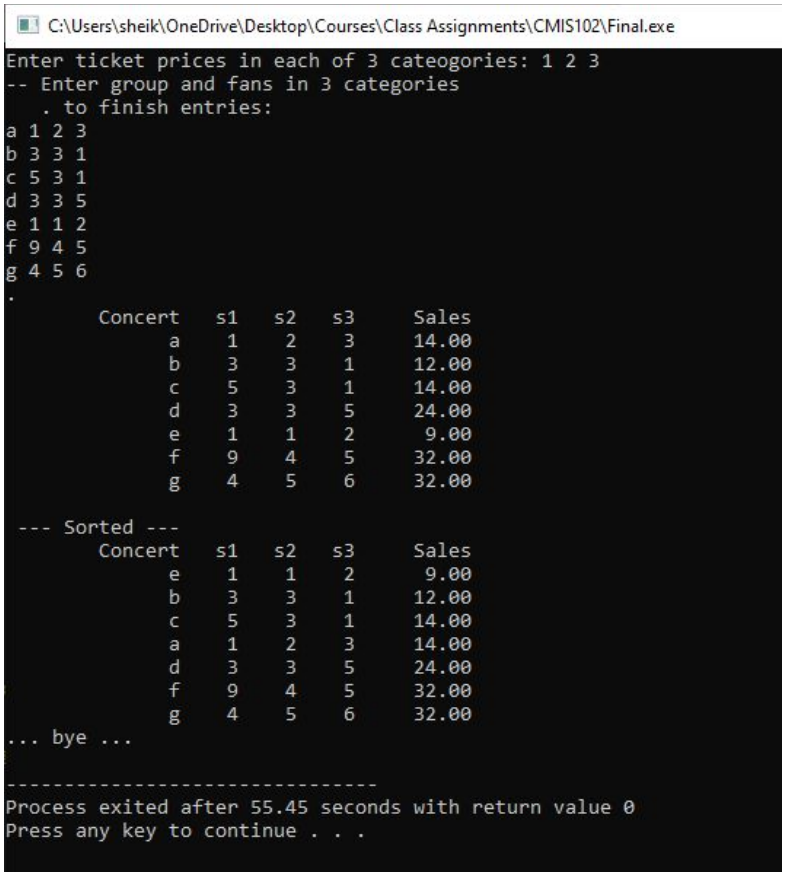
C Code:

```
/* Final.cpp
*Date: May 5, 2020
*Dev: Attiqa Sheikh
*Purpose: program that calculates ticket sales and sorts them appropriately
*/

#include <stdio.h>

#define MAXN 100 // max characters in a group/concert name
#define MAXG  50 // max concerts/groups
#define MAXC   3 // max categories

char  group  [MAXG][MAXN];
int   fans   [MAXG][MAXC];
float prices [MAXC];
float sales  [MAXG];
int   count = 0;

void printArray () {
  printf ("%15s%5s%5s%5s%10s\n",
  "Concert", "s1", "s2", "s3", "Sales");
  for (int i = 0; i < count; i++) {
    printf ("%15s", group [i]);
    for (int j = 0; j < MAXC; j++) {
      printf ("%5d", fans[i][j]);
    } // end for each category
    printf ("%10.2f\n", sales [i]);
  } // end for each group
} // end function printArray

void computeSales () {
  for (int i = 0; i < count; i++) {
    sales [i] = 0;
    for (int j = 0; j < MAXC; j++) {
      sales [i] += prices [j] * fans [i][j];
    } // end for each category
  } // end for each group
} // end function computeSales
```

```
void switchRows (int m, int n) {
  char tc;
  int  ti;
  float v;
  // printf ("Switching %d with %d\n", m, n);
  for (int i = 0; i < MAXN; i++) {
    tc = group [m][i];
    group [m][i] = group [n][i];
    group [n][i] = tc;
  } // end for each character in a group name
  for (int i = 0; i < MAXC; i++) {
    ti = fans [m][i];
    fans [m][i] = fans [n][i];
    fans [n][i] = ti;
  } // end for each fan category
  v = sales [m];
  sales [m] = sales [n];
  sales [n] = v;
} // end switch

int findMinSales (int m) {
  float min = sales [m];
  int target = m;
  for (int i = m+1; i < count; i++)
    if (sales [i] < min) {
      min = sales [i];
      target = i;
    } // end new max found
  return target;
} // end function findMinSales

void sortBySales () {
  int target;
  for (int i = 0; i < count; i++) {
    target = findMinSales (i);
    if (target > i)
      switchRows (i, target);
  } // for each concert
} // end function sortBySales

void getData () {
  // for (int i = 0; i < MAXG; i++) sales [i] = 0;
  printf ("Enter ticket prices in each of %d categories: ", MAXC);
  for (int i = 0; i < MAXC; i++)
```

```
   scanf ("%f", &prices [i]);
  printf ("-- Enter group and fans in %d categories\n", MAXC);
  printf ("   . to finish entries:\n");
  for (int i = 0; i < MAXG; i++) {
    scanf ("%s", group[i]);
    if (group [i][0] == '.')
      break;
    count++;
    for (int j = 0; j < MAXC; j++)
      scanf ("%d", &fans[i][j]);
  } // end for each group
} // end function getData

int main(void) {
        getData ();
        computeSales ();
        printArray ();
        printf ("\n --- Sorted ---\n");
        sortBySales ();
        printArray ();
        printf("... bye ...\n");
        return 0;
}
```

Screen Capture



a. Add a function to print welcome information, including your name and an introduction to the project, and, of course, call this function as the first instruction in main.

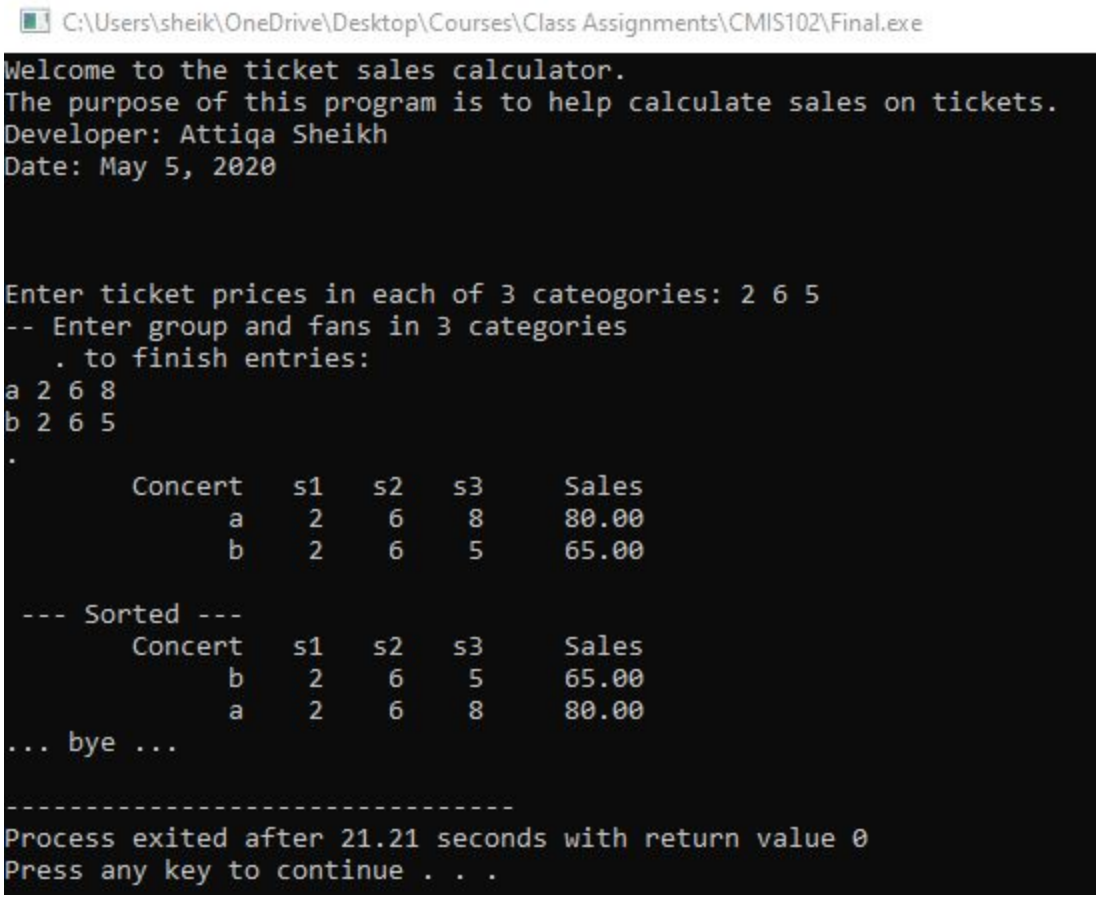
Welcome

```
void welcome(){
    printf("Welcome to the ticket sales calculator.\n");
    printf("The purpose of this program is to help calculate sales on tickets.\n");
    printf("Developer: Attiqa Sheikh\n");
    printf("Date: May 5, 2020 \n\n\n\n"); }
```

Main function

```
int main(void) {
    welcome();
    getData ();
    computeSales ();
    printArray ();
    printf ("\n --- Sorted ---\n");
    sortBySales ();
    printArray ();
    printf("... bye ...\n");
    return 0; }
```

Screen Capture



2. Modify the program to add a function to compute and display the total sales for all the concerts. Support your experimentation with screen captures of executing the new code.

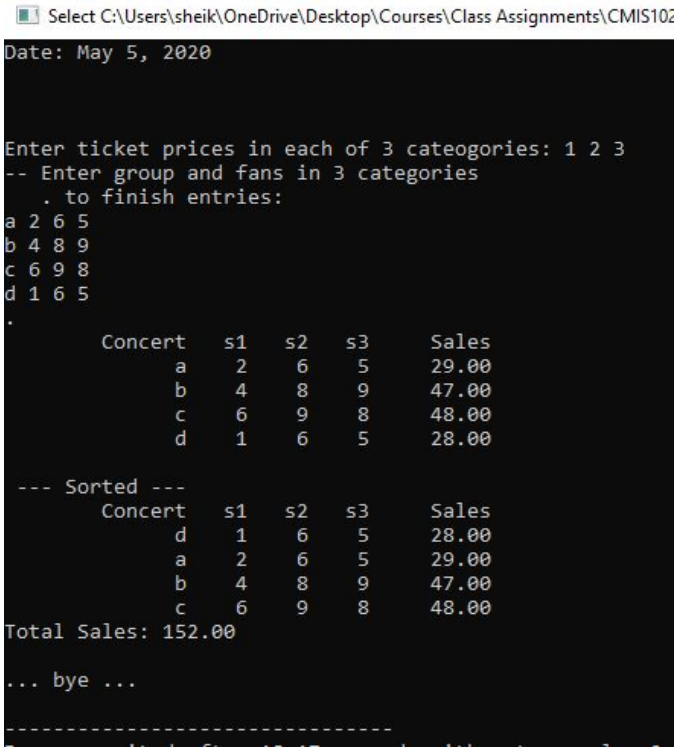
totalSales function

```
//calculates total
void totalSales(){
        //total
        float total =0;
        int saleSize = sizeof(sales);
        //loop for the size
        for(int i = 0; i<saleSize; i++){
                total += sales[i];
        }
        printf("Total Sales: %.2f \n\n", total);
}//end function
```

Main function

```
int main(void) {
        welcome();
        getData ();
        computeSales ();
        printArray ();
        printf ("\n --- Sorted ---\n");
        sortBySales ();
        printArray ();
        totalSales();
        printf("... bye ...\n");
        return 0; }
```

Screen Capture



3. Enhance the program to allow the user to enter 4 categories. Explain the changes you made to the code, and create appropriate test data files. Support your experimentation with screen captures of executing the new code.

I first changed the value of MAXC from 3 to 4 so that it could support the total number of categories. The printf statement was changed to have a fourth category with a definition of the data type.

Max categories

```
#define MAXN 100 // max characters in a group/concert name
#define MAXG  50 // max concerts/groups
#define MAXC   4 // max categories
```

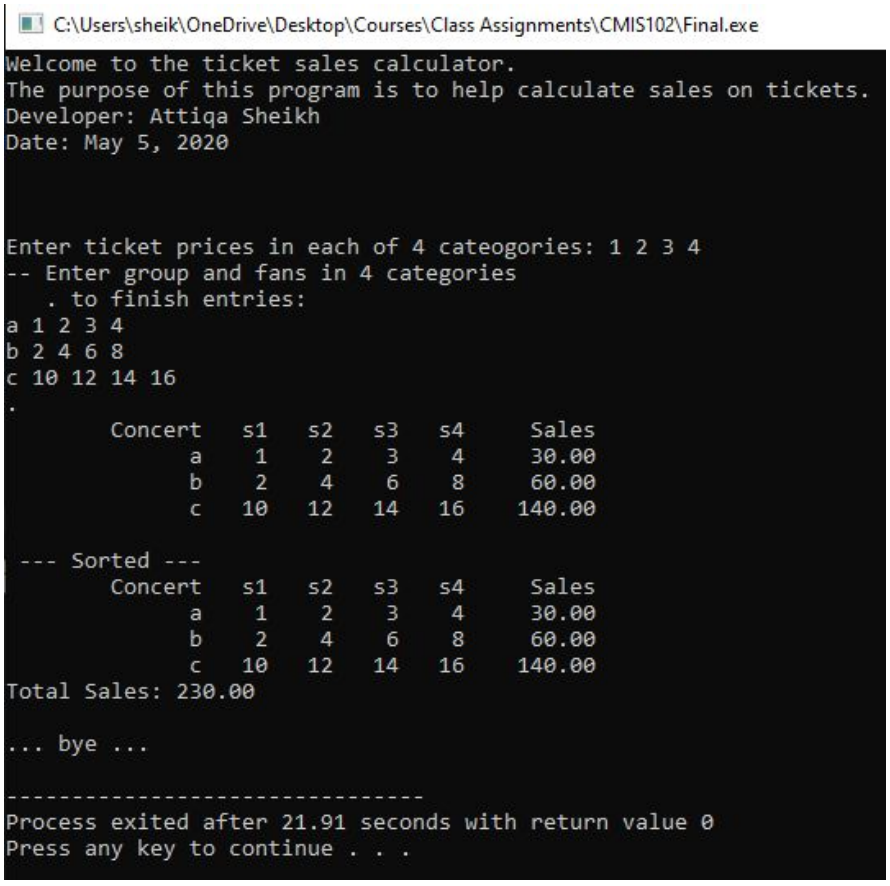
printArray function

```
void printArray () {
        printf ("%15s%5s%5s%5s%5s%10s\n",
        "Concert", "s1", "s2", "s3","s4", "Sales");
        for (int i = 0; i < count; i++) {
                printf ("%15s", group [i]);
        for (int j = 0; j < MAXC; j++) {
                printf ("%5d", fans[i][j]);
        } // end for each category
        printf ("%10.2f\n", sales [i]);
        } // end for each group
} // end function printArray
```

Test#	Input	Expected Output	Notes
#1	1 2 3 4 a 1 2 3 4 b 2 4 6 8 c 3 4 5 6 d 8 9 7 2 e 6 4 8 9 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 2 3 4 -- Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 2 4 6 8 c 3 4 5 6 d 8 9 7 2 e 6 4 8 9 . Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 b 2 4 6 8 60.00 c 3 4 5 6 50.00 d 8 9 7 2 55.00	Simple test case with whole numbers.

		e 6 4 8 9 74.00 --- Sorted --- Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 c 3 4 5 6 50.00 d 8 9 7 2 55.00 b 2 4 6 8 60.00 e 6 4 8 9 74.00 Total Sales: 269.00 ... bye ...	

Screen Captures



4. Prepare a new test table with at least 2 more test cases listing input and expected output for the new code you created, supporting 4 categories.

Test #	Input	Expected Output	Notes
#1	2 5.2 6 9 a 1 2 8 7 b 5 6 8 6 c 2 6 3 7 d 1 2 3 4 e 2 6 5 3 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 2 5.2 6 9 -- Enter group and fans in 4 categories . to finish entries: a 1 2 8 7 b 5 6 8 6 c 2 6 3 7 d 1 2 3 4 e 2 6 5 3 . Concert s1 s2 s3 s4 Sales a 1 2 8 7 123.40 b 5 6 8 6 143.20 c 2 6 3 7 116.20 d 1 2 3 4 66.40 e 2 6 5 3 92.20 --- Sorted --- Concert s1 s2 s3 s4 Sales d 1 2 3 4 66.40 e 2 6 5 3 92.20 c 2 6 3 7 116.20 a 1 2 8 7 123.40 b 5 6 8 6 143.20 Total Sales: 541.40 ... bye ...	Decimal in categories
#2	1.2 3 5.5 6 a 1 2 3 6 b 2.3 5 6 7	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1.2 3 5.5 6 -- Enter group and fans in 4 categories	Cannot have decimals within sales categories. Prints the rest of the entries out as 0. Since the entries are invalid, the program ends it automatically without requiring a “.”

		. to finish entries: a 1 2 3 6 b 2.3 5 6 7 Concert s1 s2 s3 s4 Sales a 1 2 3 6 59.70 b 2 0 0 0 2.40 --- Sorted --- Concert s1 s2 s3 s4 Sales b 2 0 0 0 2.40 a 1 2 3 6 59.70 Total Sales: 62.10 ... bye ...	

Test #1

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 2 5.2 6 9
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 8 7
b 5 6 8 6
c 2 6 3 7
d 1 2 3 4
e 2 6 5 3
.
       Concert   s1   s2   s3   s4     Sales
             a    1    2    8    7    123.40
             b    5    6    8    6    143.20
             c    2    6    3    7    116.20
             d    1    2    3    4     66.40
             e    2    6    5    3     92.20

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             d    1    2    3    4     66.40
             e    2    6    5    3     92.20
             c    2    6    3    7    116.20
             a    1    2    8    7    123.40
             b    5    6    8    6    143.20
Total Sales: 541.40

... bye ...

--------------------------------
Process exited after 94.25 seconds with return value 0
Press any key to continue . . .
```

Test #2

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1.2 3 5.5 6
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 3 6
b 2.3 5 6 7
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    6     59.70
             b    2    0    0    0      2.40

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             b    2    0    0    0      2.40
             a    1    2    3    6     59.70
Total Sales: 62.10

... bye ...

--------------------------------
Process exited after 23.09 seconds with return value 0
Press any key to continue . . .
```

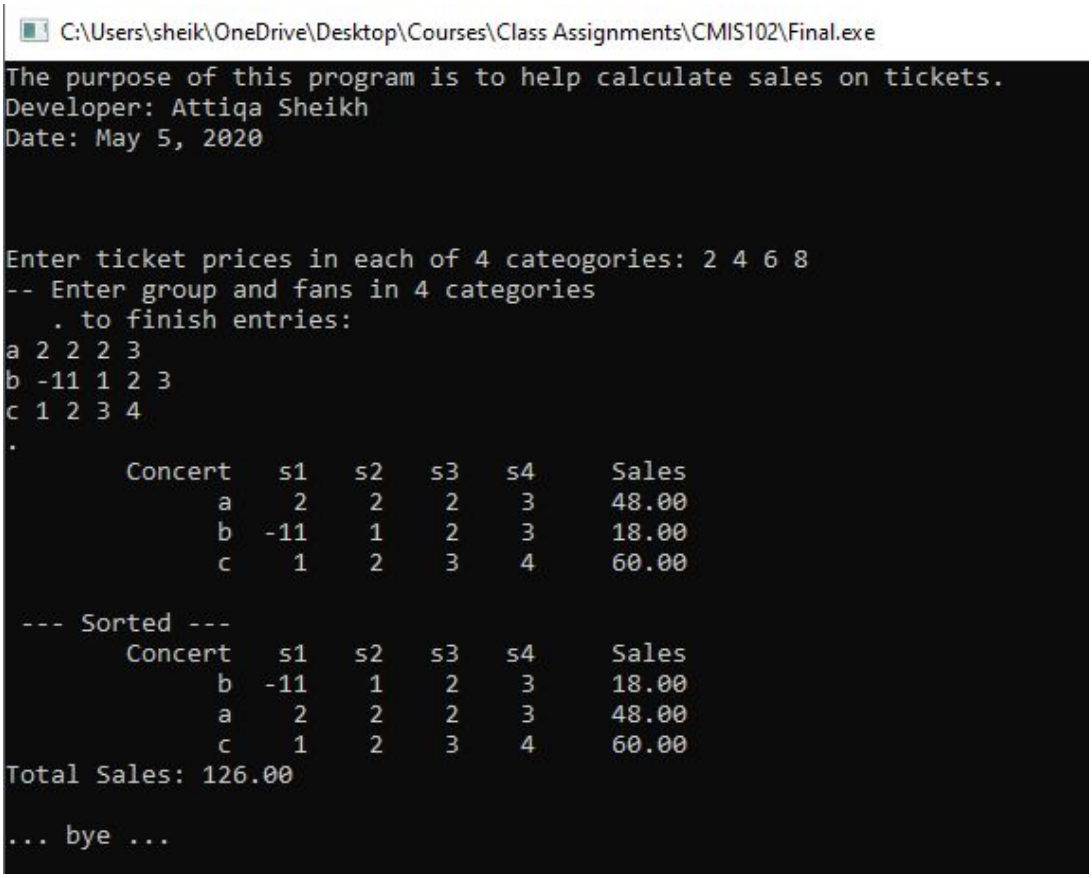
5. Create a variety of test cases focusing on the sorting algorithm, such as the final element is the smallest, the entire set is already sorted, etc. Explain the purpose of each test case, and check your code against each of those cases.

Test #	Input	Expected Output	Notes
#1	2 4 6 8 a 2 2 2 3 b -11 1 2 3 c 1 2 3 4 .	The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 2 4 6 8 -- Enter group and fans in 4 categories . to finish entries: a 2 2 2 3 b -11 1 2 3 c 1 2 3 4 . Concert s1 s2 s3 s4 Sales a 2 2 2 3 48.00 b -11 1 2 3 18.00 c 1 2 3 4 60.00 --- Sorted --- Concert s1 s2 s3 s4 Sales b -11 1 2 3 18.00 a 2 2 2 3 48.00 c 1 2 3 4 60.00 Total Sales: 126.00 ... bye ...	Values include a negative number.
#2	1 2 3 4 a 1 2 3 4 b 1 2 3 4 c 1 2 3 4 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 2 3 4 -- Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 4 c 1 2 3 4 . Concert s1 s2 s3 s4 Sales	Values are all the same.

		a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 --- Sorted --- Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 Total Sales: 90.00 ... bye ...	
#3	1 2 3 .2 a 1 2 3 4 b 1 2 3 6 c 1 2 3 8 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 2 3 .2 -- Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 6 c 1 2 3 8 . Concert s1 s2 s3 s4 Sales a 1 2 3 4 14.80 b 1 2 3 6 15.20 c 1 2 3 8 15.60 --- Sorted --- Concert s1 s2 s3 s4 Sales a 1 2 3 4 14.80 b 1 2 3 6 15.20 c 1 2 3 8 15.60 Total Sales: 45.60 ... bye ...	Difference between sales is a fraction.
#4	1 1 1 1 a 1 2 3 4 b 3 1 1 3 c 1 1 1 1 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 1 1 1	Largest number first, smallest number last.

		-- Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 3 1 1 3 c 1 1 1 1 . Concert s1 s2 s3 s4 Sales a 1 2 3 4 10.00 b 3 1 1 3 8.00 c 1 1 1 1 4.00 --- Sorted --- Concert s1 s2 s3 s4 Sales c 1 1 1 1 4.00 b 3 1 1 3 8.00 a 1 2 3 4 10.00 Total Sales: 22.00 ... bye ...	

Test #1



Test #2

C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

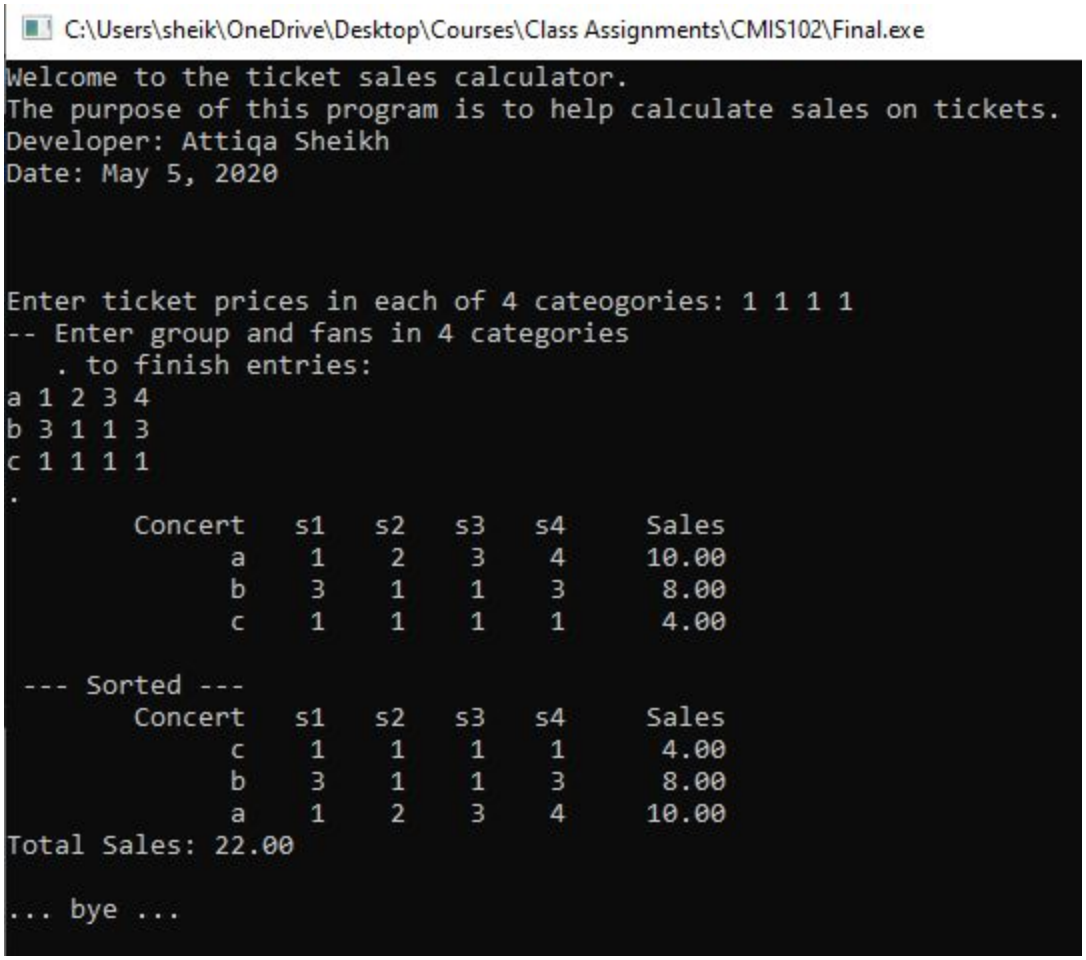
```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 3 4
b 1 2 3 4
c 1 2 3 4
.
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     30.00
             b    1    2    3    4     30.00
             c    1    2    3    4     30.00

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     30.00
             b    1    2    3    4     30.00
             c    1    2    3    4     30.00
Total Sales: 90.00

... bye ...
```

Test #3

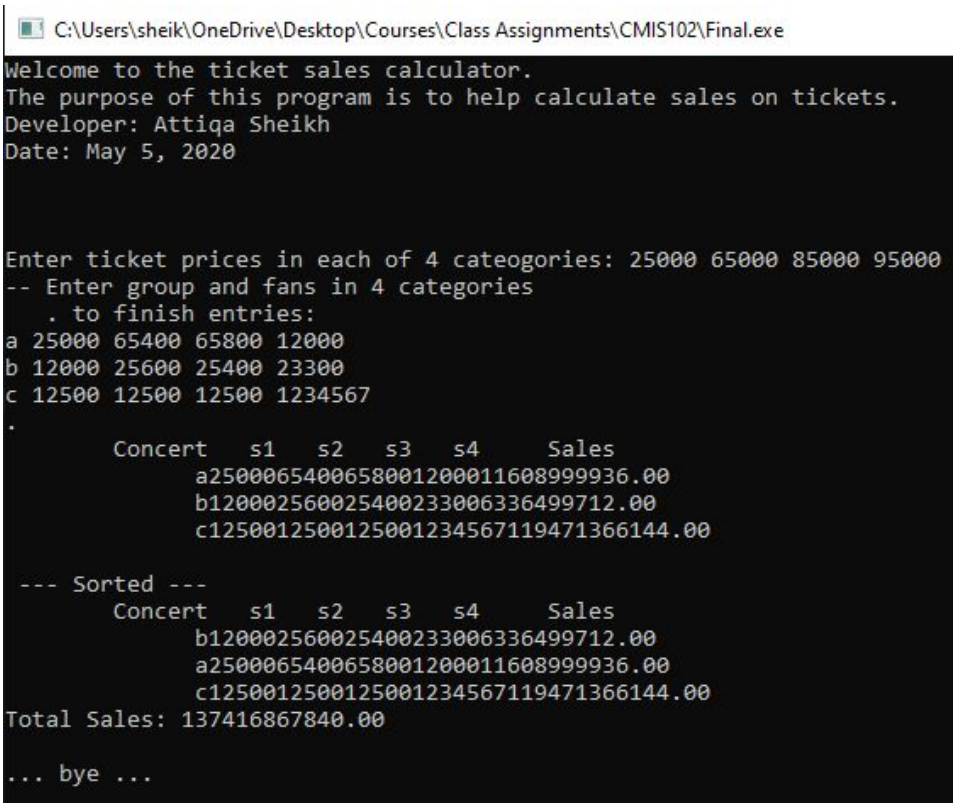
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1 2 3 .2
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 3 4
b 1 2 3 6
c 1 2 3 8
.
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     14.80
             b    1    2    3    6     15.20
             c    1    2    3    8     15.60

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     14.80
             b    1    2    3    6     15.20
             c    1    2    3    8     15.60
Total Sales: 45.60

... bye ...
```

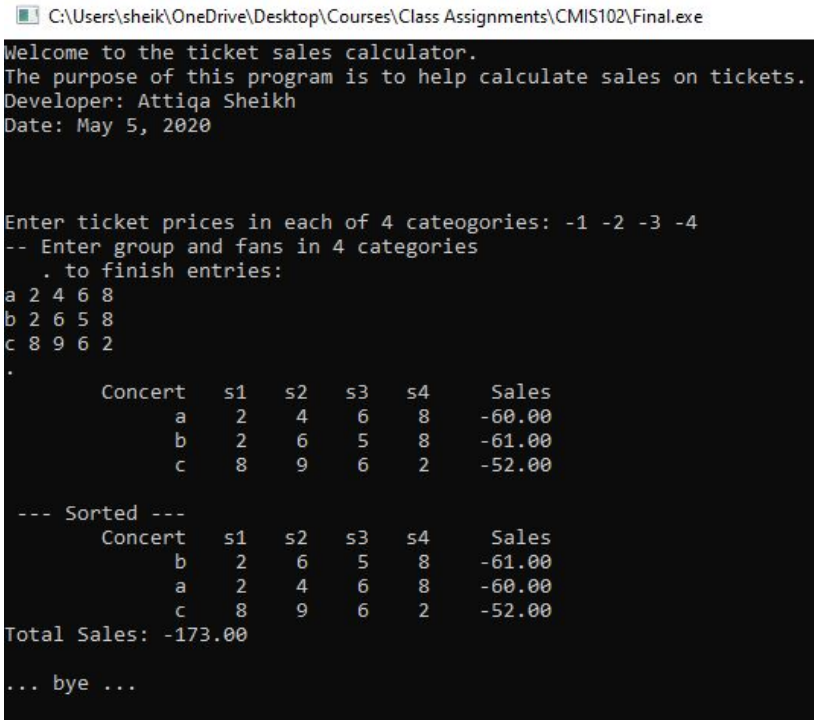
Test #4


C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 1 1 1
-- Enter group and fans in 4 categories
. to finish entries:
a 1 2 3 4
b 3 1 1 3
c 1 1 1 1
.
Concert s1 s2 s3 s4 Sales
a 1 2 3 4 10.00
b 3 1 1 3 8.00
c 1 1 1 1 4.00
--- Sorted ---
Concert s1 s2 s3 s4 Sales
c 1 1 1 1 4.00
b 3 1 1 3 8.00
a 1 2 3 4 10.00
Total Sales: 22.00
... bye ...

6. Try using different inputs:
    a. What changes would you suggest to handle larger, more realistic numbers?
    The data type of float should be changed to handle much larger numbers. Since the total calculation can be a bit off for larger numbers, it is more practical to make the data type a double. Doubles have a larger precision of 8 bytes rather than floats that have 4 bytes.



    b. What happens if any of the numbers, such as the ticket prices, are negative?
    Mathematically, the ticket prices can be negative and the final result will also be negative for it to be interpreted in the same manner. Even if the sales are able to be negative in the program, realistically it doesn't make sense for it to be a negative number.



c. What are your recommendations concerning negative input values?
We can create a statement within our ticket price and total sales functions that doesn't allow the user to input a negative value, and instead put the user in a loop where if a negative input value is entered, they are prompted to try again an unlimited number of times until the user inputs an appropriate value.

7. What changes should be made to the code if the customer wished to sort on the number of fans in category 1, the first of the three (or four) categories?
Make those changes, test your code and confirm that it is working correctly.

findMinSales

```
int findMinSales (int m) {
        float min = fans [m][0];
        int target = m;
        for (int i = m+1; i < count; i++)
                if (fans [i][0] < min) {
                min = fans [i][0];
        target = i;
        } // end new max found
                return target;
        } // end function findMinSales
```

Test #	Input	Expected Output	Notes
#1	1 2 3 4 a 1 2 3 4 b 1 2 3 4 c 1 2 3 4 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 2 3 4 -- Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 4 c 1 2 3 4 . Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 --- Sorted --- Concert s1 s2 s3 s4 Sales	Simple numbers inputted.

		a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 Total Sales: 90.00 ... bye ...	
#2	1 1 1 1 a 5 5 5 5 b 6 4 5 5 c 6 3 6 5 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 1 1 1 -- Enter group and fans in 4 categories . to finish entries: a 5 5 5 5 b 6 4 5 5 c 6 3 6 5 . Concert s1 s2 s3 s4 Sales a 5 5 5 5 20.00 b 6 4 5 5 20.00 c 6 3 6 5 20.00 --- Sorted --- Concert s1 s2 s3 s4 Sales a 5 5 5 5 20.00 b 6 4 5 5 20.00 c 6 3 6 5 20.00 Total Sales: 60.00 ... bye ...	The data that is entered is opposite from the order it is sorted.
#3	1 2 3 4 a 6 3 6 5 b 10 10 3 5 c 1 120 100 300 .	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1 2 3 4 -- Enter group and fans in 4 categories . to finish entries: a 6 3 6 5 b 10 10 3 5 c 1 120 100 300	The total sales is the opposite of the first category.

		. Concert s1 s2 s3 s4 Sales a 6 3 6 5 50.00 b 10 10 3 5 59.00 c 1 120 100 300 1741.00 --- Sorted --- Concert s1 s2 s3 s4 Sales c 1 120 100 300 1741.00 a 6 3 6 5 50.00 b 10 10 3 5 59.00 Total Sales: 1850.00 ... bye ...	

Test #1

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 3 4
b 1 2 3 4
c 1 2 3 4
.
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     30.00
             b    1    2    3    4     30.00
             c    1    2    3    4     30.00

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             a    1    2    3    4     30.00
             b    1    2    3    4     30.00
             c    1    2    3    4     30.00
Total Sales: 90.00

... bye ...
```

Test #2

C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1 1 1 1
-- Enter group and fans in 4 categories
   . to finish entries:
a 5 5 5 5
b 6 4 5 5
c 6 3 6 5
.
       Concert   s1   s2   s3   s4     Sales
             a    5    5    5    5     20.00
             b    6    4    5    5     20.00
             c    6    3    6    5     20.00

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             a    5    5    5    5     20.00
             b    6    4    5    5     20.00
             c    6    3    6    5     20.00
Total Sales: 60.00

... bye ...
```

Test #3

C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020



Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
   . to finish entries:
a 6 3 6 5
b 10 10 3 5
c 1 120 100 300
.
       Concert   s1   s2   s3   s4     Sales
             a    6    3    6    5     50.00
             b   10   10    3    5     59.00
             c    1  120  100  300   1741.00

 --- Sorted ---
       Concert   s1   s2   s3   s4     Sales
             c    1  120  100  300   1741.00
             a    6    3    6    5     50.00
             b   10   10    3    5     59.00
Total Sales: 1850.00

... bye ...
```

C Code with Completed Exercises

```
/* Final.cpp
*Date: May 5, 2020
*Dev: Attiqa Sheikh
*Purpose: program that calculates ticket sales and sorts them appropriately
*/

#include <stdio.h>

#define MAXN 100 // max characters in a group/concert name
#define MAXG  50 // max concerts/groups
#define MAXC   4 // max categories

char  group  [MAXG][MAXN];
int   fans   [MAXG][MAXC];
float prices [MAXC];
float sales  [MAXG];
int   count = 0;

void welcome(){
        printf("Welcome to the ticket sales calculator.\n");
        printf("The purpose of this program is to help calculate sales on tickets.\n");
        printf("Developer: Attiqa Sheikh\n");
        printf("Date: May 5, 2020 \n\n\n\n");
}
void printArray () {
  printf ("%15s%5s%5s%5s%5s%5s%10s\n",
  "Concert", "s1", "s2", "s3","s4", "Sales");
  for (int i = 0; i < count; i++) {
    printf ("%15s", group [i]);
    for (int j = 0; j < MAXC; j++) {
      printf ("%5d", fans[i][j]);
    } // end for each category
    printf ("%10.2f\n", sales [i]);
  } // end for each group
} // end function printArray

void computeSales () {
  for (int i = 0; i < count; i++) {
    sales [i] = 0;
    for (int j = 0; j < MAXC; j++) {
      sales [i] += prices [j] * fans [i][j];
    } // end for each category
  } // end for each group
```

```
} // end function computeSales

void switchRows (int m, int n) {
  char tc;
  int  ti;
  float v;
  // printf ("Switching %d with %d\n", m, n);
  for (int i = 0; i < MAXN; i++) {
    tc = group [m][i];
    group [m][i] = group [n][i];
    group [n][i] = tc;
  } // end for each character in a group name
  for (int i = 0; i < MAXC; i++) {
    ti = fans [m][i];
    fans [m][i] = fans [n][i];
    fans [n][i] = ti;
  } // end for each fan category
  v = sales [m];
  sales [m] = sales [n];
  sales [n] = v;
} // end switch

int findMinSales (int m) {
  float min = fans [m][0];
  int target = m;
  for (int i = m+1; i < count; i++)
    if (fans [i][0] < min) {
      min = fans [i][0];
      target = i;
    } // end new max found
  return target;
} // end function findMinSales

void sortBySales () {
  int target;
  for (int i = 0; i < count; i++) {
    target = findMinSales (i);
    if (target > i)
      switchRows (i, target);
  } // for each concert
} // end function sortBySales

//calculates total
void totalSales(){
```

```
        //total
        float total =0;
        int saleSize = sizeof(sales);
        //loop for the size
        for(int i = 0; i<saleSize; i++){
                total += sales[i];
        }
        printf("Total Sales: %.2f \n\n", total);
}//end function

void getData () {
  // for (int i = 0; i < MAXG; i++) sales [i] = 0;
  printf ("Enter ticket prices in each of %d cateogories: ", MAXC);
  for (int i = 0; i < MAXC; i++)
    scanf ("%f", &prices [i]);
  printf ("-- Enter group and fans in %d categories\n", MAXC);
  printf ("   . to finish entries:\n");
  for (int i = 0; i < MAXG; i++) {
    scanf ("%s", group[i]);
    if (group [i][0] == '.')
      break;
    count++;
    for (int j = 0; j < MAXC; j++)
      scanf ("%d", &fans[i][j]);
  } // end for each group
} // end function getData

int main(void) {
welcome();
  getData ();
  computeSales ();
  printArray ();
  printf ("\n --- Sorted ---\n");
  sortBySales ();
  printArray ();
  totalSales();
  printf("... bye ...\n");
  return 0;
}
```