

Name: _____

Vectors and Pointers

Problems to do in Lab. Do not report this.

Problem 1. Menu Driven Program, improved with vectors

The menu driven program must be improved this way:

- It must use vectors, instead of arrays. So, there is no limit for the size.
- It must include an option to display students on a range of ages.

To be reported on canvas. Create a PDF. Include screenshots of code and execution. Include copy-pasteable text of code. Be careful with variable names and indentation. You must use the templates.

Problem 2. Number Analysis Program

Write a program that asks the user for a file name. Assume the file contains a series of float numbers, each written on a separate line (maximum 20). The program should read the contents of the file into a vector, only the numbers greater or equal than 10.0 and then display the following data:

- The lowest number in the vector
- The total of the numbers in the vector
- The average of the numbers in the array excluding the greatest and the lowest.

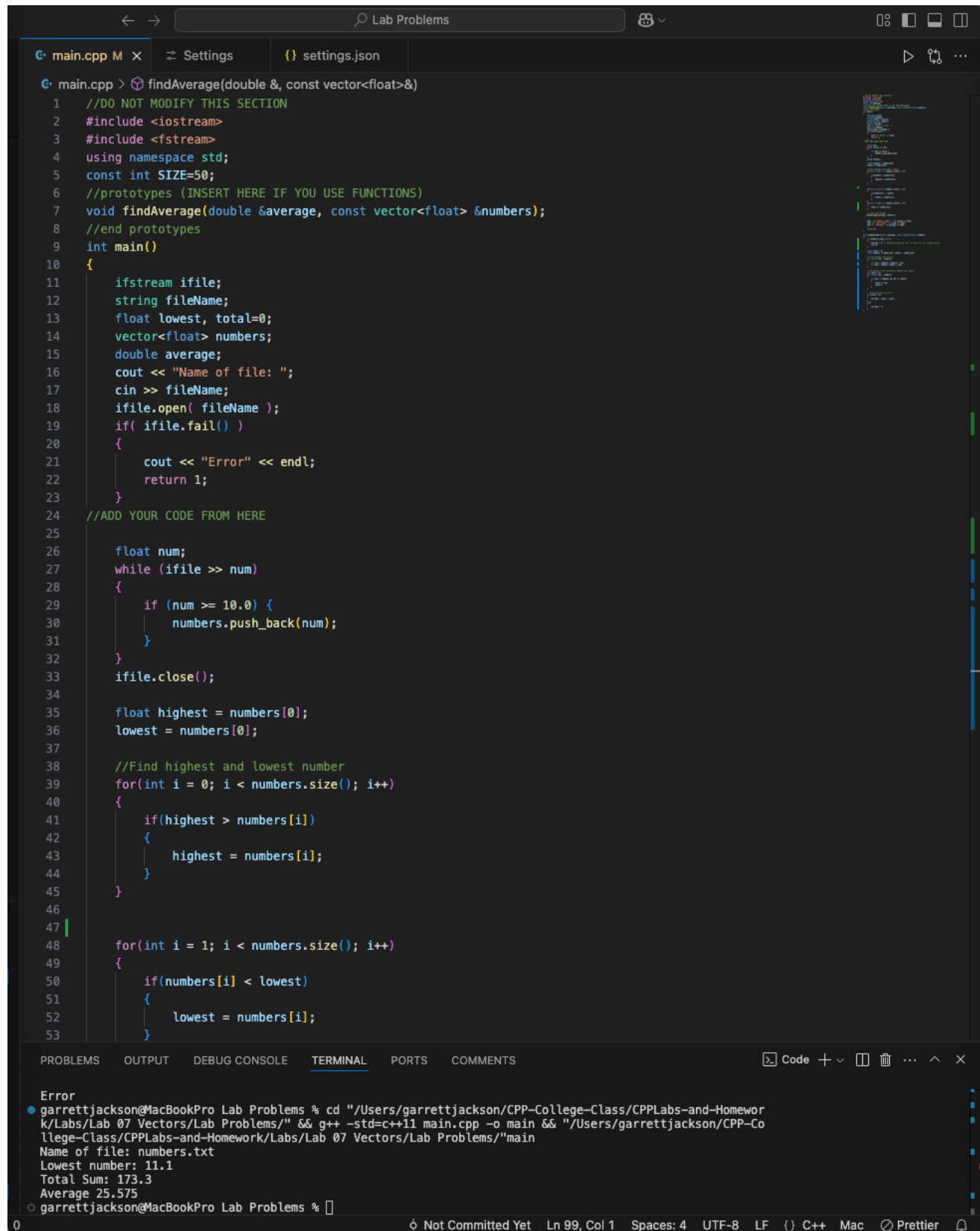
TEMPLATE:

```
//DO NOT MODIFY THIS SECTION
#include <iostream>
#include <fstream>
using namespace std;
const int SIZE=50;
//prototypes (INSERT HERE IF YOU USE FUNCTIONS)

//end prototypes
int main()
{
    ifstream ifile;
    string fileName;
    float lowest, total=0;

    vector<float> numbers;
    double average;
    cout << "Name of file: ";
    cin >> fileName;
    ifile.open( fileName );
```

```
    if( ifile.fail() )
    {
        cout << "Error" << endl;
        return 1;
    }
//ADD YOUR CODE FROM HERE
```

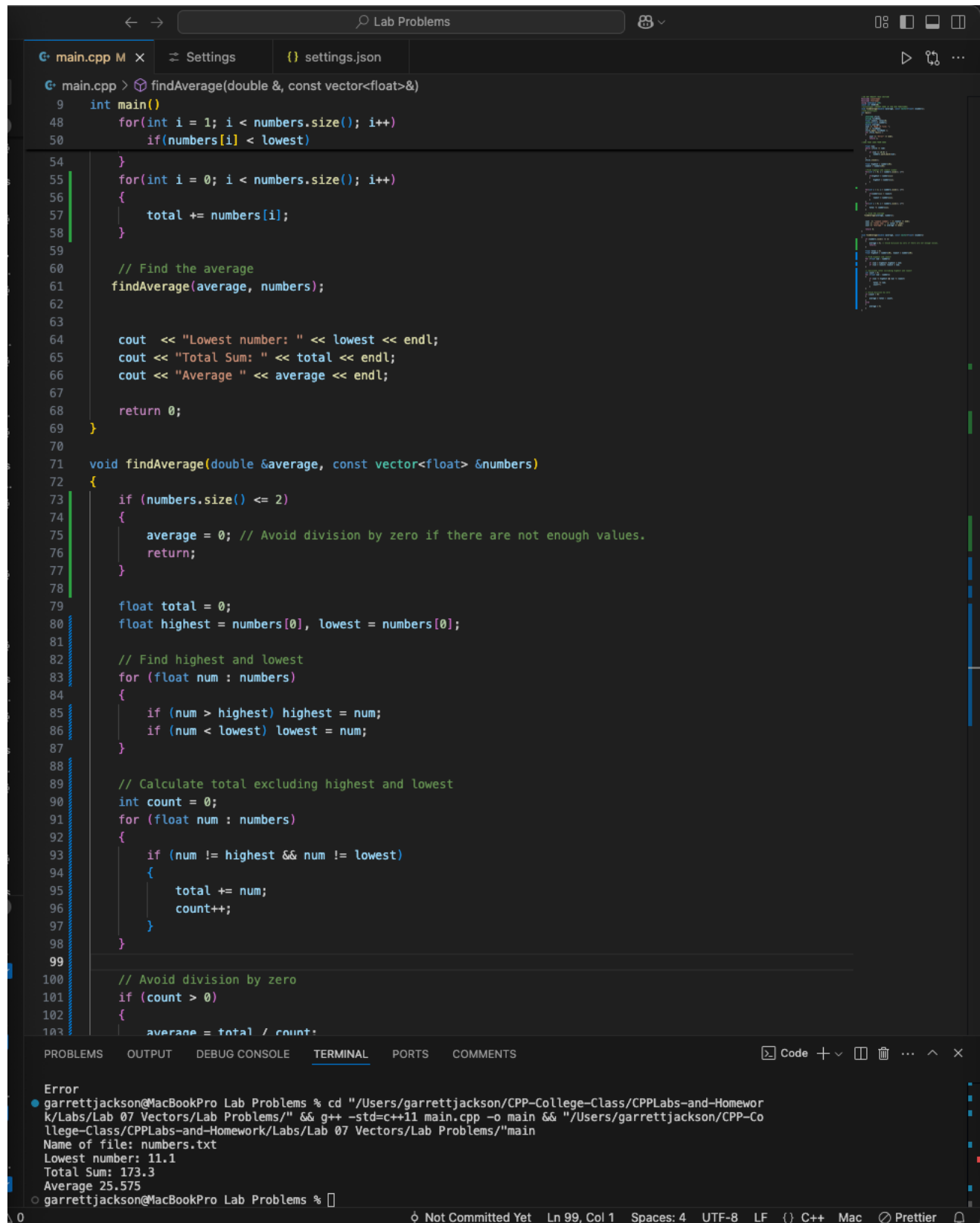


```
main.cpp M x Settings settings.json
main.cpp > findAverage(double &, const vector<float>&)
1 //DO NOT MODIFY THIS SECTION
2 #include <iostream>
3 #include <fstream>
4 using namespace std;
5 const int SIZE=50;
6 //prototypes (INSERT HERE IF YOU USE FUNCTIONS)
7 void findAverage(double &average, const vector<float> &numbers);
8 //end prototypes
9 int main()
10 {
11     ifstream ifile;
12     string fileName;
13     float lowest, total=0;
14     vector<float> numbers;
15     double average;
16     cout << "Name of file: ";
17     cin >> fileName;
18     ifile.open( fileName );
19     if( ifile.fail() )
20     {
21         cout << "Error" << endl;
22         return 1;
23     }
24     //ADD YOUR CODE FROM HERE
25
26     float num;
27     while (ifile >> num)
28     {
29         if (num >= 10.0) {
30             numbers.push_back(num);
31         }
32     }
33     ifile.close();
34
35     float highest = numbers[0];
36     lowest = numbers[0];
37
38     //Find highest and lowest number
39     for(int i = 0; i < numbers.size(); i++)
40     {
41         if(highest > numbers[i])
42         {
43             highest = numbers[i];
44         }
45     }
46
47     for(int i = 1; i < numbers.size(); i++)
48     {
49         if(numbers[i] < lowest)
50         {
51             lowest = numbers[i];
52         }
53     }
54 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS

```
Error
● garrettjackson@MacBookPro Lab Problems % cd "/Users/garrettjackson/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/" && g++ -std=c++11 main.cpp -o main && "/Users/garrettjackson/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/"main
Name of file: numbers.txt
Lowest number: 11.1
Total Sum: 173.3
Average 25.575
○ garrettjackson@MacBookPro Lab Problems %
```

0 Not Committed Yet Ln 99, Col 1 Spaces: 4 UTF-8 LF {} C++ Mac Prettier



```
main.cpp M X Settings {} settings.json
main.cpp > findAverage(double &, const vector<float>&)
9  int main()
48  for(int i = 1; i < numbers.size(); i++)
50  if(numbers[i] < lowest)
54  }
55  for(int i = 0; i < numbers.size(); i++)
56  {
57      total += numbers[i];
58  }
59
60  // Find the average
61  findAverage(average, numbers);
62
63
64  cout << "Lowest number: " << lowest << endl;
65  cout << "Total Sum: " << total << endl;
66  cout << "Average " << average << endl;
67
68  return 0;
69 }
70
71 void findAverage(double &average, const vector<float> &numbers)
72 {
73     if (numbers.size() <= 2)
74     {
75         average = 0; // Avoid division by zero if there are not enough values.
76         return;
77     }
78
79     float total = 0;
80     float highest = numbers[0], lowest = numbers[0];
81
82     // Find highest and lowest
83     for (float num : numbers)
84     {
85         if (num > highest) highest = num;
86         if (num < lowest) lowest = num;
87     }
88
89     // Calculate total excluding highest and lowest
90     int count = 0;
91     for (float num : numbers)
92     {
93         if (num != highest && num != lowest)
94         {
95             total += num;
96             count++;
97         }
98     }
99
100    // Avoid division by zero
101    if (count > 0)
102    {
103        average = total / count;
104    }
105 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS

Error

garrettjackson@MacBookPro Lab Problems % cd "/Users/garrettjackson/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/" && g++ -std=c++11 main.cpp -o main && "/Users/garrettjackson/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/"main

Name of file: numbers.txt

Lowest number: 11.1

Total Sum: 173.3

Average 25.575

garrettjackson@MacBookPro Lab Problems %

Not Committed Yet Ln 99, Col 1 Spaces: 4 UTF-8 LF {} C++ Mac Prettier

```
← → Lab Problems
main.cpp M X Settings {} settings.json
main.cpp > findAverage(double &, const vector<float> &)
9 int main()
10 // Find the average
11 findAverage(average, numbers);
12
13 cout << "Lowest number: " << lowest << endl;
14 cout << "Total Sum: " << total << endl;
15 cout << "Average " << average << endl;
16
17 return 0;
18 }
19
20 void findAverage(double &average, const vector<float> &numbers)
21 {
22     if (numbers.size() <= 2)
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44             total += num;
45             count++;
46         }
47     }
48
49     // Avoid division by zero
50     if (count > 0)
51     {
52         average = total / count;
53     }
54     else
55     {
56         average = 0;
57     }
58 }
59
60 PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
Error
garrettjackson@MacBookPro Lab Problems % cd "/Users/garrettjackson/CPP-College-Class/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/" && g++ -std=c++11 main.cpp -o main && "/Users/garrettjackson/CPP-College-Class/CPPLabs-and-Homework/Labs/Lab 07 Vectors/Lab Problems/"main
Name of file: numbers.txt
Lowest number: 11.1
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```

```
//DO NOT MODIFY THIS SECTION
```

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#include <iostream>
```

```
#include <fstream>

using namespace std;

const int SIZE=50;

//prototypes (INSERT HERE IF YOU USE FUNCTIONS)

void findAverage(double &average, const vector<float> &numbers);

//end prototypes

int main()
{
    ifstream ifile;

    string fileName;

    float lowest, total=0;

    vector<float> numbers;

    double average;

    cout << "Name of file: ";

    cin >> fileName;

    ifile.open( fileName );

    if( ifile.fail() )
    {
        cout << "Error" << endl;

        return 1;
    }

    //ADD YOUR CODE FROM HERE

    float num;

    while (ifile >> num)
    {
        if (num >= 10.0) {
            numbers.push_back(num);
        }
    }
}
```

```
}

infile.close();

float highest = numbers[0];

lowest = numbers[0];

//Find highest and lowest number
for(int i = 0; i < numbers.size(); i++)
{
    if(highest > numbers[i])
    {
        highest = numbers[i];
    }
}

for(int i = 1; i < numbers.size(); i++)
{
    if(numbers[i] < lowest)
    {
        lowest = numbers[i];
    }
}

for(int i = 0; i < numbers.size(); i++)
{
    total += numbers[i];
}

// Find the average
```

```
findAverage(average, numbers);

cout << "Lowest number: " << lowest << endl;
cout << "Total Sum: " << total << endl;
cout << "Average " << average << endl;

return 0;
}

void findAverage(double &average, const vector<float> &numbers)
{
    if (numbers.size() <= 2)
    {
        average = 0; // Avoid division by zero if there are not enough values.
        return;
    }

    float total = 0;
    float highest = numbers[0], lowest = numbers[0];

    // Find highest and lowest
    for (float num : numbers)
    {
        if (num > highest) highest = num;
        if (num < lowest) lowest = num;
    }

    // Calculate total excluding highest and lowest
```



```
int count = 0;

for (float num : numbers)
{
    if (num != highest && num != lowest)
    {
        total += num;
        count++;
    }
}

// Avoid division by zero
if (count > 0)
{
    average = total / count;
}
else
{
    average = 0;
}
}
```