Basic C++ programming

By

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EE2510 Sec. 021, Spring 2021

Week 1 lab

Milwaukee School of Engineering

Submitted to:

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EECS Department

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Objective

The objective of this lab is to create a calculator use an IDE Code blocks using the given header file called, “calculator.h” and restrictions by our instructor.

Description

Write a main function that shows different functions on the console, user picks an option and get the inputs needed for that operation. Afterwards, perform the operation and print the results. Must implement calculator.h file without changing its prototype and can create any additional functions if needed. It should not output unnecessary information to the windows command line.

Operators needed to be done: my_basic_math(+,-,*,/,exponents), my_average(average of an array), my_find_large_small(min and max), my_series_parallel(resistance total for a circuit)

Conclusions

The lab was successful and was able to implement all the required operators detailed in LAB1_S21 pdf. What I learned during this lab is more than importantly the differences in C vs C++ and the uses of dynamic memory. The biggest difference with C and C++ other than its syntax it is the additional logic that can be down such as the use of dynamic memory. The reason why I used dynamic memory other than just value of array of size length is because I had no idea the actual length that the user would need or want. So dynamic memory became user in this case. Lastly, another fundamental insight I had during this lab was the use of pointers in functions and the basics of pointers and address. Having a function with the parameters of int* or type* is called function by pointer/reference. In which instead of taking the whole value of the type it takes the pointer to the type instead. This saves memory in during run time and allows the for a faster calculation then function by value.

Main code:

```
#include <iostream>
#include "calculatorfunctions.h"
using namespace std;

int main()
{
    cout << "Hello EE2510! This is your calacultor " << endl;
    //calculator operator
    int option;

    //number option for (1-5)
    int num1;
    //number option for (1-5)
    int num2;

    //output for any function
    float output;

    //return value
    int return_val;

    //new array pointer
    int *newarray;
    //length of array
    int length;

    //large and small integer values
    int large;
    int small;
```

```
    while(1){
    cout<<"Please select the option you want below\n"<<endl;
    cout<<" 1-addition\n 2-subtraction\n 3-multiplication\n 4-division\n 5-exponent\n";
    cout<<" 6-finding average\n 7-finding largest and smallest value in array\n";
    cout<<" 8-finding resistance of series or parallel circuit\n"<<endl;
    cin>>option;
    cout << "your option number is: "<<option <<endl;

        if( (option >0) && (option<6) ){
            cout<<"please select a number:"<<endl;
            cin>>num1;
            cout<<"please select another number"<<endl;
            cin>>num2;
            cout<<"number 1 is:"<<num1<<"\n"<<"number 2 is:"<<num2<<"\n"<<endl;

            return_val= my_basic_math(option,num1,num2,&output);
        }
        else{
         cout<<"please input your length:"<<endl;
                cin>>length;
                newarray = new(nothrow) int[length];
                if(newarray == 0){
                    cout<<"could not create array\n";
                }
                else{
                for(int i=0; i<length; i++){
                cout<<"enter values to be stored:"<<i+1<<":"<<endl;
                cin>>newarray[i];
```

```
            }
            cout<<"array values are are:"<<endl;

            cout<<"[";
            //prints out array values
            for(int j=0; j<length; j++){
                cout<<newarray[j]<<",";
                }
            cout<<"]"<<endl;
        if( option==6){
            //FUNCTIONS used for new values
            //where newarray is the address of my array
            return_val = my_average(newarray, length, &output);
            }
        if( option ==7){
            return_val = my_find_large_small(newarray, length, &large, &small);
        }
        if( option ==8){
            int selection;
            cout<<"please pick a selection 1-series, 2-parallel, any num for exit\n"<<endl;
            cin>>selection;
             return_val = my_series_parallel(newarray, length, selection, &output);
        }
                }
     delete[] newarray;
        }
        cout<<"return:"<<return_val<<endl;
    }
    return 0;
```

Function cpp. File

```cpp
#include "calculatorfunctions.h"
#include <iostream>
#include <string>

using namespace std;

int my_basic_math(int num, int op1, int op2, float*store){
    //created a variable called sum
    //this variable is only for this function
    float sum;

    //+ property
    if(num==1){
        sum = op1 + op2;
    }
    //- property
    else if(num==2){
        sum = op1 - op2;
    }
    //multiplication function that i created
    else if(num==3){
        sum = op1 * op2;
    }

    //division with division 0 not possible
    else if(num==4){
        if(op2==0){
            cout<<"cannot divide by zero try again"<<endl;
            return 1;
        }
        else{
```

```cpp
            sum = (float)op1 / (float)op2;
        }
    }
    else if(num==5){
        //making sum as the power that is being raised to
        if(op2>0){
            sum = 1;
            for(int j=0; j<op2; j++){
            sum = (op1*sum);
            }
        }
        else if(op2<0){
            int demon = 1;
               for(int k=0; k>op2; k--){
               demon = (op1*demon);
               }
               sum = 1.0/demon;
        }
        //if exponent is 0 then value is 1
        else{
            sum = 1;
        }
    }
    else{
        cout<<"oops there was error nothing will be given\n"<<endl;
        return 1;
    }
    *store = sum;
     cout<<"your result is:\n"<<*store<<endl;
    return 0;
}
```

```
int my_average(int arr[], int length, float* output){
    //passed in the address of new array starting point and declared it
    //as a integer
    if(length ==0){
     cout<<"garbage result"<<endl;
         return 1;
    }
    float total = 0.0;
     for(int j=0; j<length;j++){
     *output = total/length;
     cout<<"your result is:\n"<<*output<<endl;
     return 0;
}

int my_find_large_small(int arr[], int length, int* largest, int* smallest){
     int small;
     int large;
     int final_large = 0 ;
     int final_small = 0 ;
     int index;

     if( length ==0){
         cout<<"garbage result"<<endl;
         return 1;
     }
     //display the array
     for(int j=0; j<length;j++){
         //first value in the array
         index = arr[j];
         //if first then save as large if not small
```

```
             if(final_large < index){
                 final_large = index;
             }
             else{
                 final_large = final_large;
             }
             if(final_small > index){
                 final_small = index;
             }
             else{
                 final_small = final_small;
             }
     }
     *largest = final_large;
     *smallest = final_small;
     cout<<"largest value is: \n"<<*largest<<endl;
     cout<<"smallest value is: \n"<<*smallest<<endl;

     return 0;
}
```

```
110  }
119
120  int my_series_parallel(int arr[], int length, int configure, float* output){
121      float total_res;
122      if(configure ==1){
123          cout<<"you picked series circuit!\n"<<endl;
124          for(int i = 0; i < length; i++){
125              total_res = arr[i]+total_res;
126          }
127      }
128
129      else if(configure ==2){
130          cout<<"you picked parallel circuit!\n"<<endl;
131          for(int i = 0; i < length; i++){
132              total_res = (1.0/arr[i])+total_res;
133          }
134          total_res = 1.0/total_res;
135      }
136      else{
137          cout<<"not a valid configuration for sorry\n"<<endl;
138          return 1;
139      }
140      *output =  total_res;
141      cout<<"the total resistance is: \n"<<*output<<endl;
142      return 0;
143  }
144
```

Header file given

```
/* * Calculatorfunctions.h *
 * Functions that need to be implemented as a part of XXZ510 Lab 1 assignment. *
 *  Created on: Feb 22, 2017
 *      Author: Joshua D. Carl, PhD
*/

#ifndef CALCULATORFUNCTIONS_H_INCLUDED
#define CALCULATORFUNCTIONS_H_INCLUDED

// Name: my_basic_math
// Purpose: Performs basic math operations.
// Returns: 0 if successful//not 0 if error
// Parameters:
//int - input - operation to perform:
//  1 - addition
//  2 - subtraction
//  3 - multiplication
//  4 - division
//  5 - exponent
//int - input - first operand
//int - input - second operand
//float* - output - pointer to memory where
//  result can be stored
int my_basic_math(int, int, int, float*);


// Name: my_average
// Purpose: Averages the values in an array.
// Returns: 0 if successful
//not 0 if error
// Parameters:int[] - input - array of data
//int - input - length of array
//float* - output - pointer to memory where
//  result can be stored
int my_average(int[], int, float*);


// Name: my_find_large_small
// Purpose: Finds the largest and smallest values in an array.
// Returns: 0 if successful
//not 0 if error
// Parameters:int[] - input - array of data
//int - input - length of array
//int* - output - pointer to memory where largest
//value in array can be stored
//int* - output - pointer to memory where smallest
//value in array can be stored
int my_find_large_small(int[], int, int*, int*);

// Name: my_series_parallel
// Purpose: Finds the equivalent resistance of a series or parallel
//sequence of resistors.
// Returns: 0 if successful
//not 0 if error
// Parameters:  int[] - input - array of resistor values
//int - input - length of array
//int - input - resistor configuration
//  1 - series
//  2 - parallel
//float* - output - pointer to memory where equivalent resistance
//  value can be stored
int my_series_parallel(int[], int, int, float*);

#endif // CALCULATORFUNCTIONS_H_INCLUDED
```

Console:

```
Hello EE2510! This is your calacultor
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
 5-exponent
 6-finding average
 7-finding largest and smallest value in array
 8-finding resistance of series or parallel circuit

1
your option number is: 1
please select a number:
20
please select another number
30
number 1 is:20
number 2 is:30

your result is:
50
return:0
Please select the option you want below
```

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

2

your option number is: 2

please select a number:

20

please select another number

30

number 1 is:20

number 2 is:30

your result is:

-10

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

3

your option number is: 3

please select a number:

3

please select another number

5

number 1 is:3

number 2 is:5

your result is:

15

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

4

your option number is: 4

please select a number:

4

please select another number

0

number 1 is:4

number 2 is:0

cannot divide by zero try again

return:1

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

4

your option number is: 4

please select a number:

20

please select another number

3

number 1 is:20

number 2 is:3

your result is:

6.66667

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

5

your option number is: 5

please select a number:

5

please select another number

-3

number 1 is:5

number 2 is:-3

your result is:

0.008

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

5

your option number is: 5

please select a number:

3

please select another number

3

number 1 is:3

number 2 is:3

your result is:

27

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

6

your option number is: 6

please input your length:

0

array values are are:

[]

garbage result

return:1

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

6

your option number is: 6

```
please input your length:
3
enter values to be stored:1:
2
enter values to be stored:2:
3
enter values to be stored:3:
5
array values are are:
[2,3,5,]
your result is:
3.33333
return:0
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
 5-exponent
 6-finding average
 7-finding largest and smallest value in array
 8-finding resistance of series or parallel circuit

7
your option number is: 7
please input your length:
0
```

array values are are:

[]

garbage result

return:1

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

7

your option number is: 7

please input your length:

5

enter values to be stored:1:

0

enter values to be stored:2:

-1

enter values to be stored:3:

1

enter values to be stored:4:

-5

enter values to be stored:5:

-1

array values are are:

[0,-1,1,-5,-1,]

largest value is:

1

smallest value is:

-5

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

8

your option number is: 8

please input your length:

3

enter values to be stored:1:

5

enter values to be stored:2:

6

enter values to be stored:3:

9

array values are are:

[5,6,9,]

please pick a selection 1-series, 2-parallel, any num for exit

1

you picked series circuit!

the total resistance is:

20

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

8

your option number is: 8

please input your length:

3

enter values to be stored:1:

3

enter values to be stored:2:

3

enter values to be stored:3:

3

array values are are:

[3,3,3,]

please pick a selection 1-series, 2-parallel, any num for exit

2

you picked parallel circuit!

the total resistance is:

1

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

8

your option number is: 8

please input your length:

0

array values are are:

[]

please pick a selection 1-series, 2-parallel, any num for exit

0

not a valid configuration for sorry

return:1

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

7-finding largest and smallest value in array

8-finding resistance of series or parallel circuit

8

your option number is: 8

please input your length:

3

enter values to be stored:1:

20

enter values to be stored:2:

21

enter values to be stored:3:

5

array values are are:

[20,21,5,]

please pick a selection 1-series, 2-parallel, any num for exit

2

you picked parallel circuit!

the total resistance is:

3.36

return:0

Please select the option you want below

1-addition

2-subtraction

3-multiplication

4-division

5-exponent

6-finding average

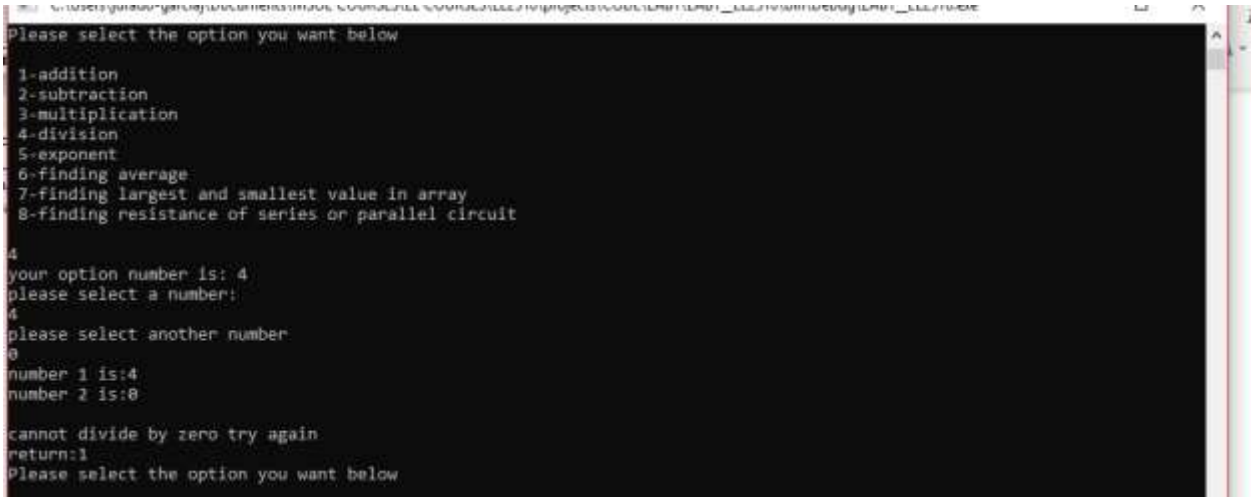
7-finding largest and smallest value in array

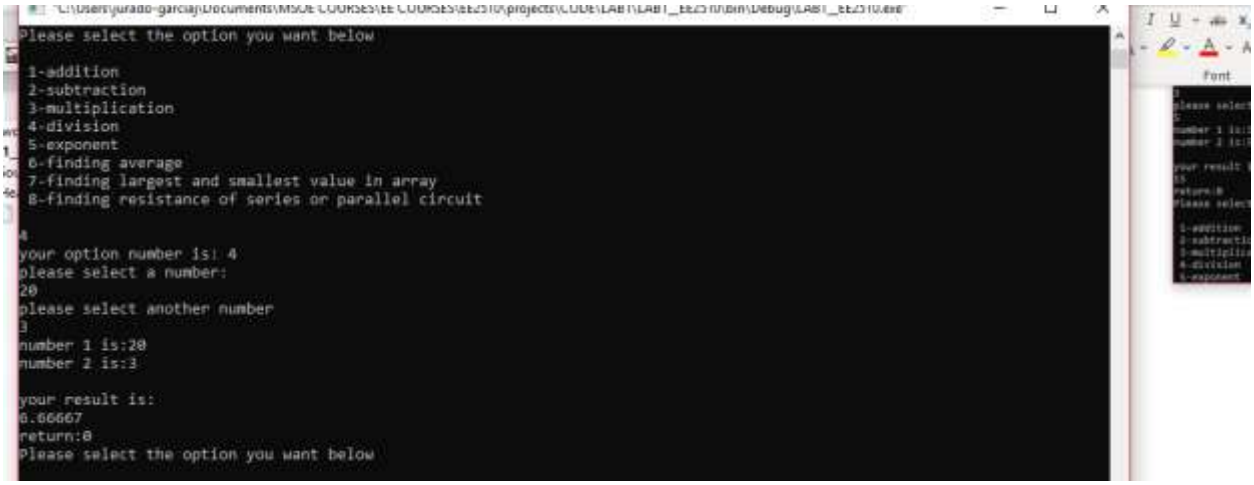
8-finding resistance of series or parallel circuit

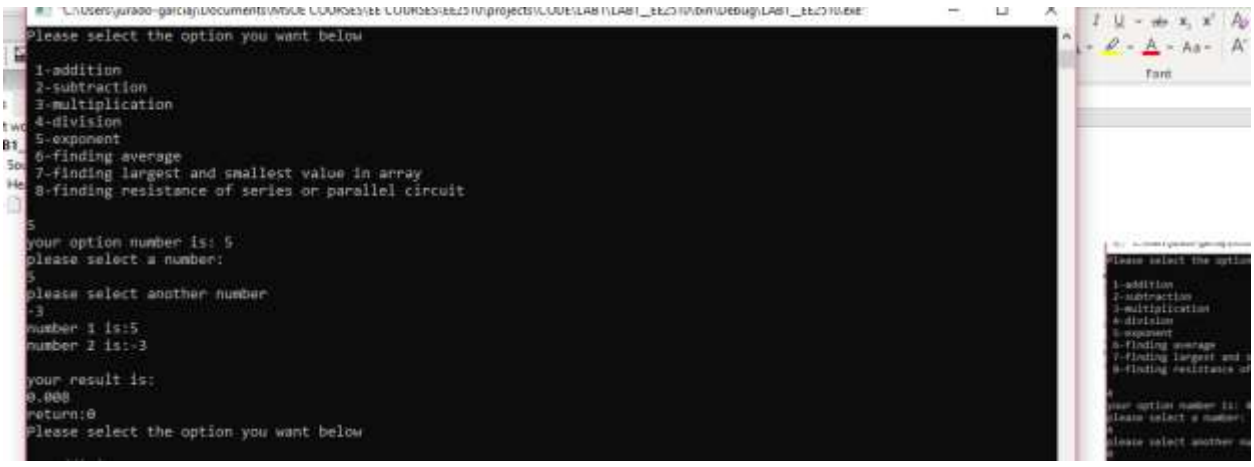
```
Hello EE2510! This is your calacultor
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
 5-exponent
 6-finding average
 7-finding largest and smallest value in array
 8-finding resistance of series or parallel circuit

1
your option number is: 1
please select a number:
20
please select another number
30
number 1 is:20
number 2 is:30

your result is:
50
return:0
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
```

```
your option number is: 2
please select a number:
20
please select another number
30
number 1 is:20
number 2 is:30

your result is:
-10
return:0
```

```
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
 5-exponent
 6-finding average
 7-finding largest and smallest value in array
 8-finding resistance of series or parallel circuit

3
your option number is: 3
please select a number:
3
please select another number
5
number 1 is:3
number 2 is:5

your result is:
15
return:0
Please select the option you want below

 1-addition
 2-subtraction
 3-multiplication
 4-division
 5-exponent
```

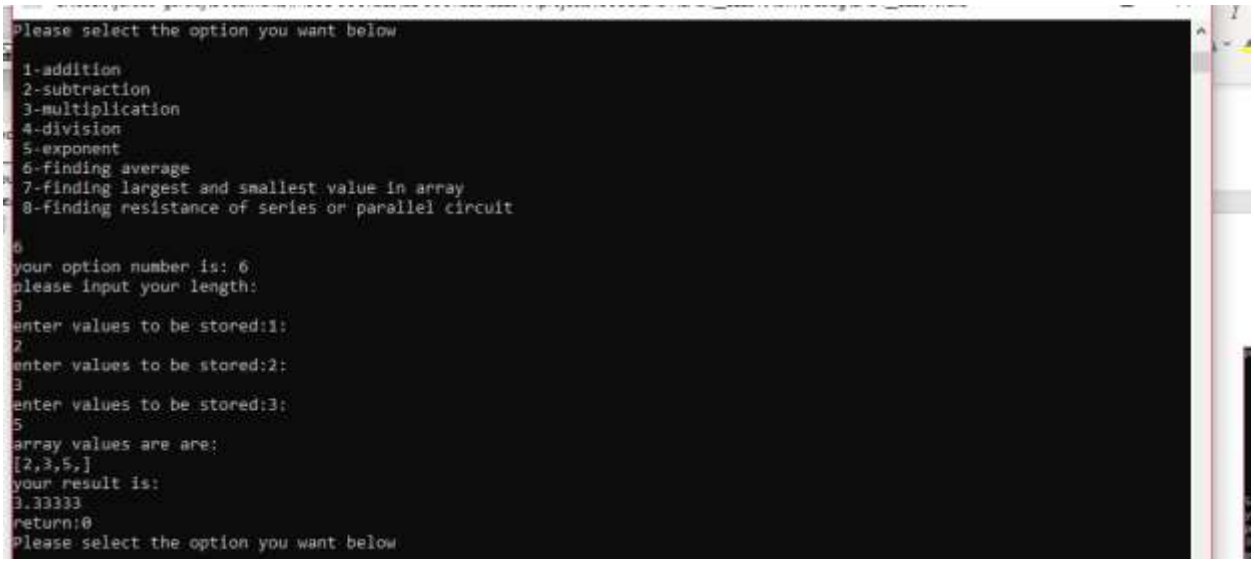

Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
4
your option number is: 4
please select a number:
4
please select another number
0
number 1 is:4
number 2 is:0
cannot divide by zero try again
return:1
Please select the option you want below

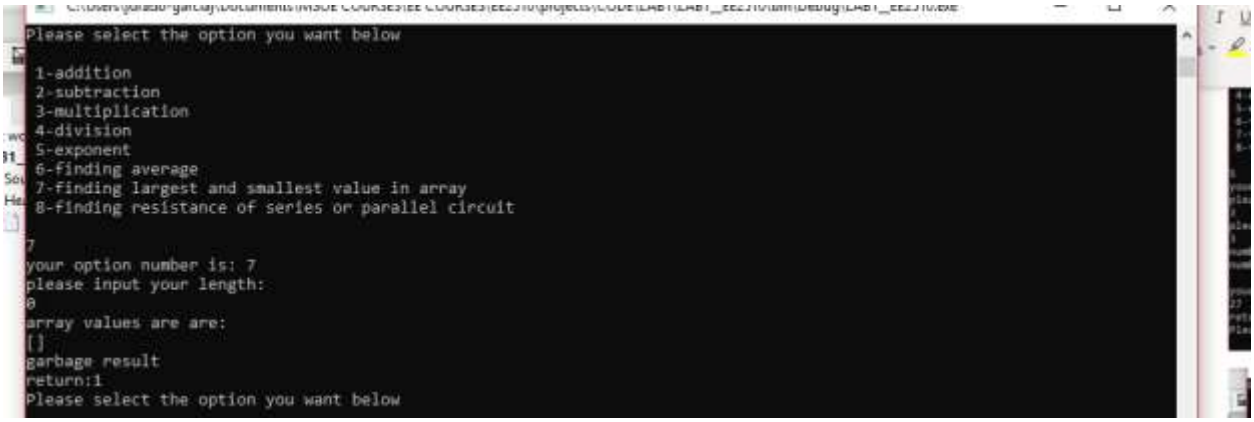

Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
4
your option number is: 4
please select a number:
20
please select another number
3
number 1 is:20
number 2 is:3
your result is:
6.66667
return:0
Please select the option you want below


Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
5
your option number is: 5
please select a number:
5
please select another number
-3
number 1 is:5
number 2 is:-3
your result is:
0.008
return:0
Please select the option you want below

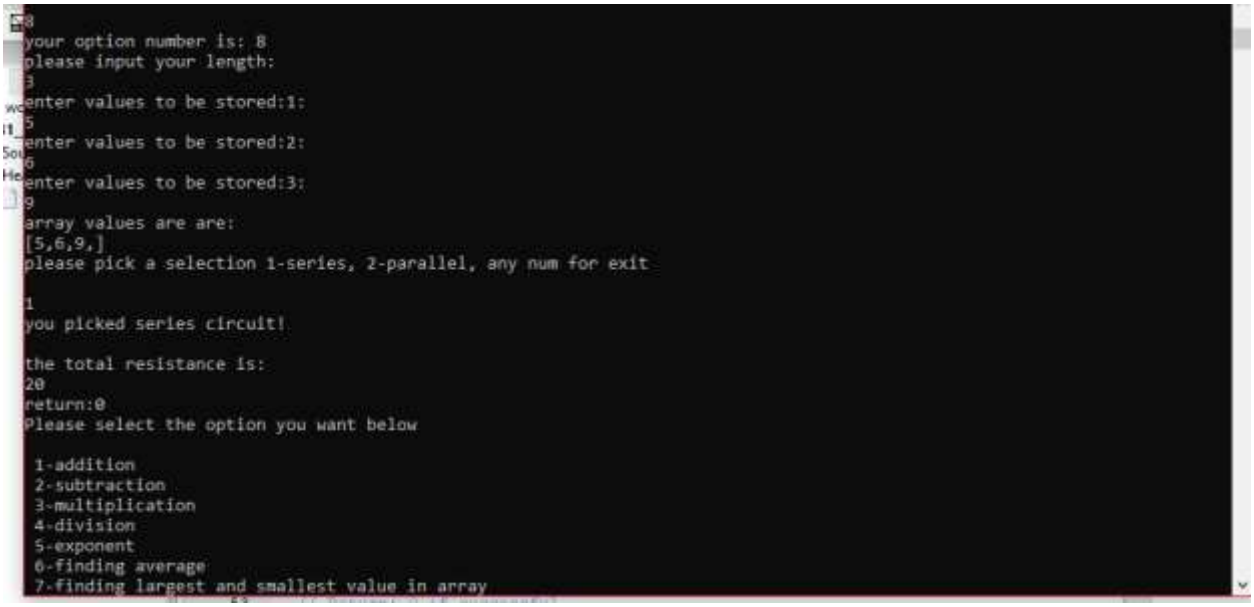

Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
5
your option number is: 5
please select a number:
3
please select another number
3
number 1 is:3
number 2 is:3
your result is:
27
return:0
Please select the option you want below

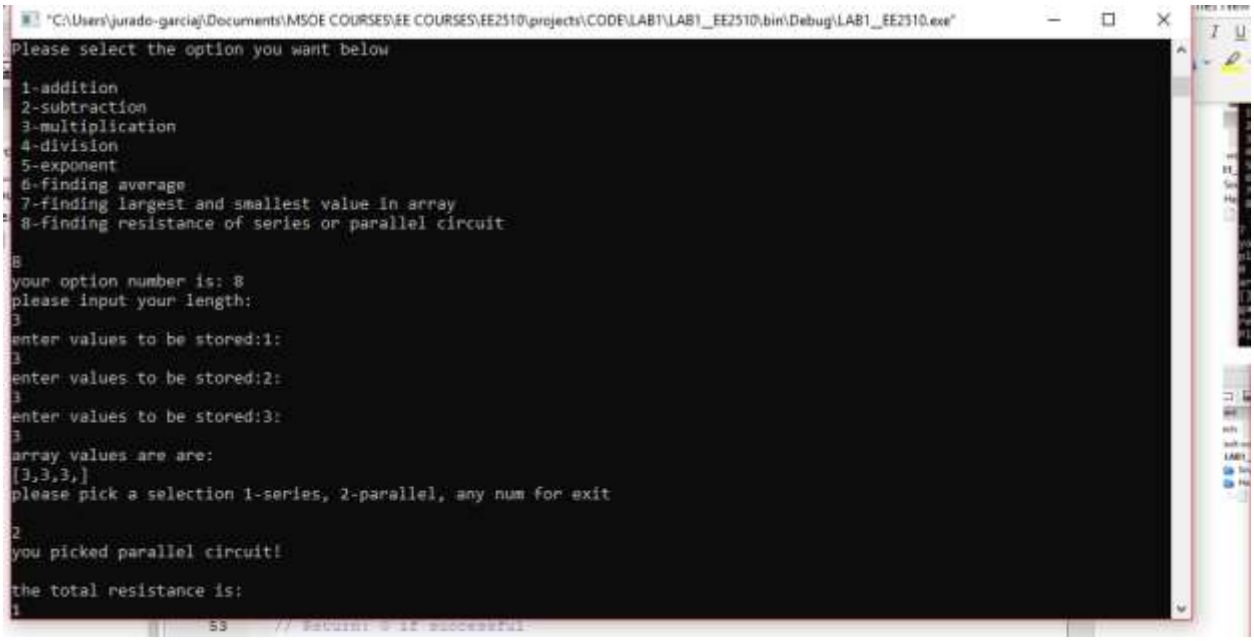

Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
6
your option number is: 6
please input your length:
0
array values are are:
[]
garbage result
return:1
Please select the option you want below

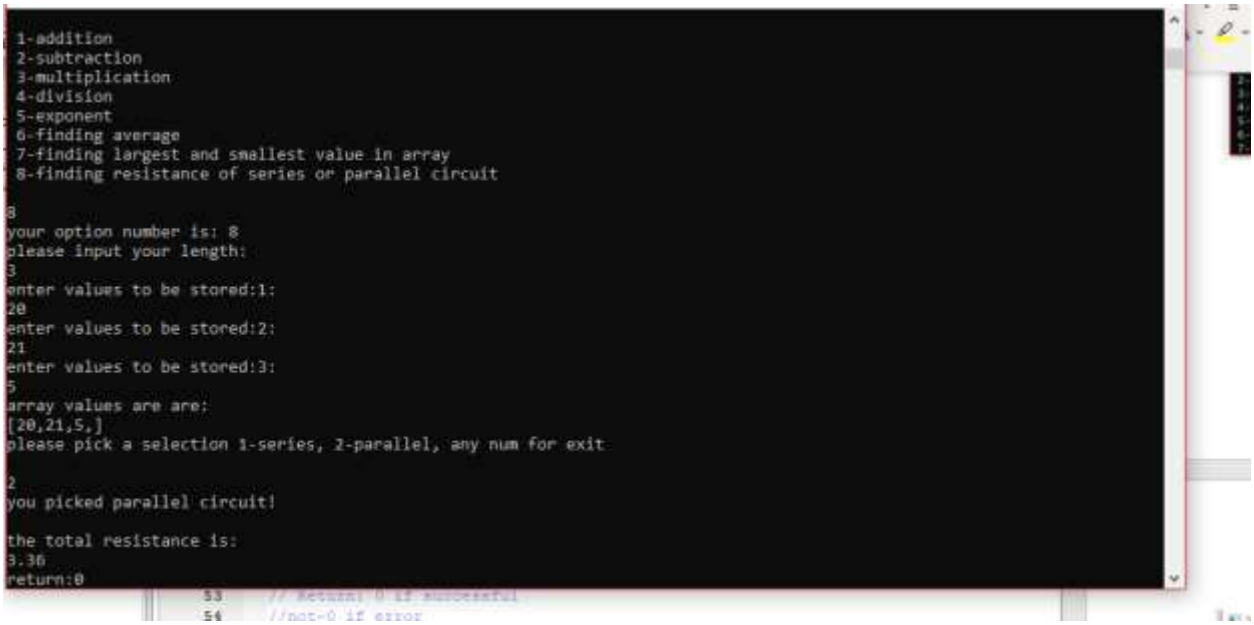

Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
6
your option number is: 6
please input your length:
3
enter values to be stored:1:
2
enter values to be stored:2:
3
enter values to be stored:3:
5
array values are are:
[2,3,5,]
your result is:
3.33333
return:0
Please select the option you want below


Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
7
your option number is: 7
please input your length:
0
array values are are:
[]
garbage result
return:1
Please select the option you want below


7
your option number is: 7
please input your length:
5
enter values to be stored:1:
0
enter values to be stored:2:
-1
enter values to be stored:3:
1
enter values to be stored:4:
-5
enter values to be stored:5:
-1
array values are are:
[0,-1,1,-5,-1,]
largest value is:
1
smallest value is:
-5
return:0
Please select the option you want below


8
your option number is: 8
please input your length:
3
enter values to be stored:1:
5
enter values to be stored:2:
6
enter values to be stored:3:
9
array values are are:
[5,6,9,]
please pick a selection 1-series, 2-parallel, any num for exit
1
you picked series circuit!
the total resistance is:
20
return:0
Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array


"C:\Users\jurado-garciaj\Documents\MSOE COURSES\EE COURSES\EE2510\projects\CODE\LAB1\LAB1_EE2510\bin\Debug\LAB1_EE2510.exe"
Please select the option you want below
1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
8
your option number is: 8
please input your length:
3
enter values to be stored:1:
3
enter values to be stored:2:
3
enter values to be stored:3:
3
array values are are:
[3,3,3,]
please pick a selection 1-series, 2-parallel, any num for exit
2
you picked parallel circuit!
the total resistance is:
1
// Return: 0 if successful


1-addition
2-subtraction
3-multiplication
4-division
5-exponent
6-finding average
7-finding largest and smallest value in array
8-finding resistance of series or parallel circuit
8
your option number is: 8
please input your length:
3
enter values to be stored:1:
20
enter values to be stored:2:
21
enter values to be stored:3:
5
array values are are:
[20,21,5,]
please pick a selection 1-series, 2-parallel, any num for exit
2
you picked parallel circuit!
the total resistance is:
3.36
return:0
// Return: 0 if successful
//not-0 if error