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Subject :- DS

Assignment #2

//*****QUESTION#1*****

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int rows, cols;
```

```
    cout << "Enter number of rows: ";
```

```
    cin >> rows;
```

```
    cout << "Enter number of columns: ";
```

```
    cin >> cols;
```

```
    int** array = new int*[rows];
```

```
    for (int i = 0; i < rows; i++) {
```

```
        array[i] = new int[cols];
```

```
    }
```

```
cout << "Enter the elements of the " << rows << "X" <<  
cols << " array:" << endl;
```

```
int sum = 0;
```

```
int product = 1;
```

```
for (int i = 0; i < rows; i++) {
```

```
    for (int j = 0; j < cols; j++) {
```

```
        cout << "Element [" << i << "][" << j << "]: ";
```

```
        cin >> array[i][j];
```

```
        sum += array[i][j];
```

```
        product *= array[i][j];
```

```
    }
```

```
}
```

```
double average = static_cast<double>(sum) / (rows *  
cols);
```

```
cout << "Sum of all elements: " << sum << endl;
```

```
cout << "Product of all elements: " << product << endl;
```

```
cout << "Average of all elements: " << average << endl;
```

```
for (int i = 0; i < rows; i++) {
```

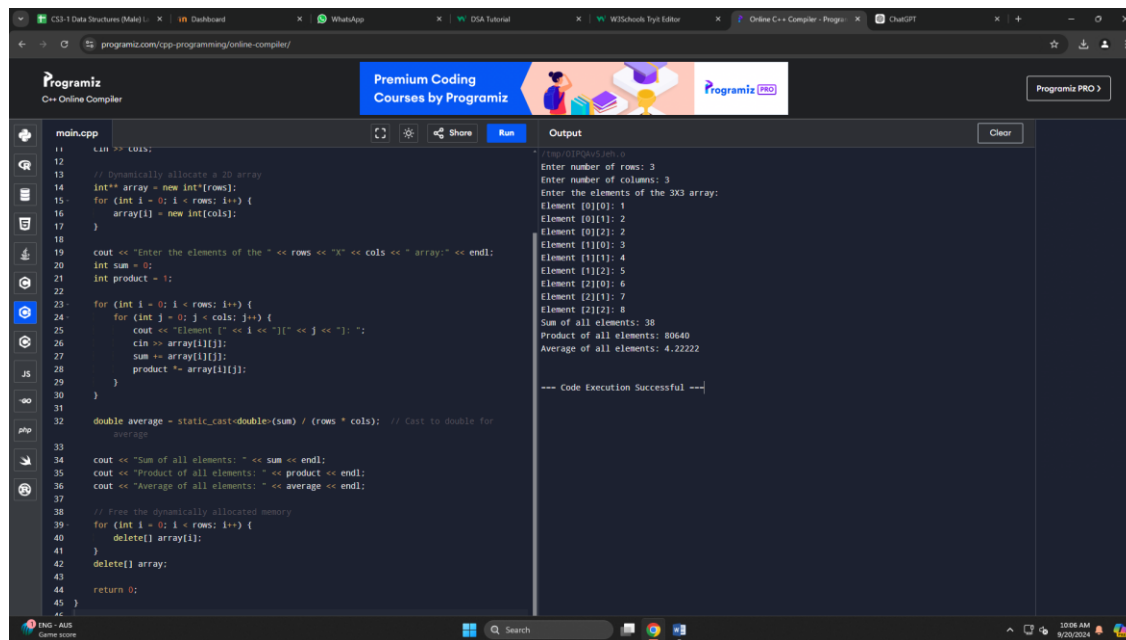
```
    delete[] array[i];
```

```
}
```

```
delete[] array;
```

```
return 0;
```

```
}
```



The screenshot shows the Programiz C++ Online Compiler interface. The code in the editor is as follows:

```
11 // C++ CODE:
12
13 // Dynamically allocate a 2D array
14 int** array = new int*[rows];
15 for (int i = 0; i < rows; i++) {
16     array[i] = new int[cols];
17 }
18
19 cout << "Enter the elements of the " << rows << "x" << cols << " array:" << endl;
20 int sum = 0;
21 int product = 1;
22
23 for (int i = 0; i < rows; i++) {
24     for (int j = 0; j < cols; j++) {
25         cout << "Element [" << i << "][" << j << "] = ";
26         cin >> array[i][j];
27         sum += array[i][j];
28         product *= array[i][j];
29     }
30 }
31
32 double average = static_cast<double>(sum) / (rows * cols); // Cast to double for
average
33
34 cout << "Sum of all elements: " << sum << endl;
35 cout << "Product of all elements: " << product << endl;
36 cout << "Average of all elements: " << average << endl;
37
38 // Free the dynamically allocated memory
39 for (int i = 0; i < rows; i++) {
40     delete[] array[i];
41 }
42 delete[] array;
43
44 return 0;
45 }
```

The output window shows the following results:

```
Enter number of rows: 3
Enter number of columns: 3
Enter the elements of the 3X3 array:
Element [0][0]: 1
Element [0][1]: 2
Element [0][2]: 2
Element [1][0]: 3
Element [1][1]: 4
Element [1][2]: 5
Element [2][0]: 6
Element [2][1]: 7
Element [2][2]: 8
Sum of all elements: 38
Product of all elements: 80640
Average of all elements: 4.22222
--- Code Execution Successful ---
```

```
//*****the end*****
```

```
/**QUESTION#2***/

#include <iostream>

using namespace std;

int main() {

    int x = 0;

    int y = 0;

    cout << "Enter value of y: ";

    cin >> y;

    cout << "Before swapping: x= " << x << " y = " << y << endl;

    int temp = x;

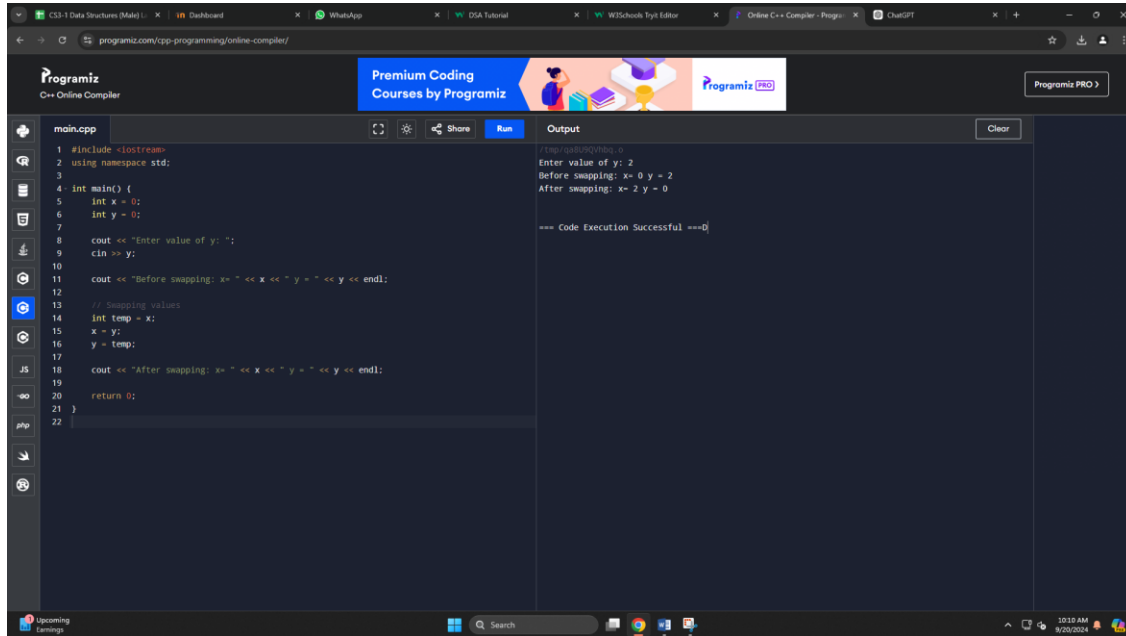
    x = y;

    y = temp;

    cout << "After swapping: x= " << x << " y = " << y << endl;

    return 0;

}
```



```
//*****the end*****
```

```
//*****QUESTION#3*****
```

```
#include <iostream> using
namespace std;
```

```
int main() {    const int size = 10;  int
values[size];    cout << "Enter 10 integer
values: " << endl;
```

```
    for (int i = 0; i < size; i++) {
cin >> values[i];  }  int
largest = values[0];  int
smallest = values[0];  for
(int i = 1; i < size; i++) {
```

```

if (values[i] > largest) {
    largest = values[i];
}

if (values[i] < smallest) {
    smallest = values[i];
}

cout << "Largest value: " << largest << endl;
cout << "Smallest value: " << smallest << endl;

return 0;
}

```

The screenshot shows the Programiz C++ Online Compiler interface. The code in the editor is as follows:

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     const int size = 10;
7     int values[size];
8     cout << "Enter 10 integer values: " << endl;
9     for (int i = 0; i < size; i++)
10     {
11         cin >> values[i];
12     }
13     int largest = values[0];
14     int smallest = values[0];
15     for (int i = 1; i < size; i++)
16     {
17         if (values[i] > largest)
18             largest = values[i];
19         if (values[i] < smallest)
20             smallest = values[i];
21     }
22 }
23
24 cout << "Largest value: " << largest << endl;
25 cout << "Smallest value: " << smallest << endl;
26
27 return 0;
28 }
29

```

The output window shows the following text:

```

Enter 10 integer values:
1
2
3
4
5
76
2
1
3
12
Largest value: 76
Smallest value: 1
--- Code Execution Successful ---

```

//*****THE END*****

//*****QUESTION#4*****

```
#include <iostream>

using namespace std;

int main()
{
    const int MONTHS = 12;

    double rainfall[MONTHS];

    double totalRainfall = 0.0;

    double averageRainfall;

    int monthWithHighest = 0;

    int monthWithLowest = 0;

    cout << "Enter the total rainfall for each of the 12 months (in MM): " << endl;

    for (int i = 0; i < MONTHS; ++i) {

        cout << "Month " << (i + 1) << ": ";

        cin >> rainfall[i];

        totalRainfall += rainfall[i];

        // Initialize monthWithHighest and monthWithLowest

        if (i == 0) {

            monthWithHighest = 0;

            monthWithLowest = 0;

        } else {

            if (rainfall[i] > rainfall[monthWithHighest]) {

                monthWithHighest = i;

            }

        }

    }

}
```

```

        if (rainfall[i] < rainfall[monthWithLowest]) {

            monthWithLowest = i;

        }

    }

}

averageRainfall = totalRainfall / MONTHS;

cout << "Total rainfall for the year: " << totalRainfall << " inches" << endl;

cout << "Average monthly rainfall: " << averageRainfall << " inches" << endl;

cout << "Month with highest rainfall: Month " << (monthWithHighest + 1) << " with " <<
rainfall[monthWithHighest] << " MM" << endl;

cout << "Month with lowest rainfall: Month " << (monthWithLowest + 1) << " with " <<
rainfall[monthWithLowest] << " MM" << endl;

return 0;

}

```

The screenshot shows the Programiz C++ Online Compiler interface. The code editor on the left contains a C++ program that prompts the user to enter rainfall for 12 months, calculates the total, average, and the months with the highest and lowest rainfall. The output window on the right displays the results of the program execution.

```

main.cpp
3
4 int main()
5 {
6     const int MONTHS = 12;
7     double rainfall[MONTHS];
8     double totalRainfall = 0.0;
9     double averageRainfall;
10    int monthWithHighest = 0;
11    int monthWithLowest = 0;
12
13    cout << "Enter the total rainfall for each of the 12 months (in MM): " << endl;
14    for (int i = 0; i < MONTHS; ++i) {
15        cout << "Month " << (i + 1) << ": ";
16        cin >> rainfall[i];
17        totalRainfall += rainfall[i];
18
19        // Initialize monthWithHighest and monthWithLowest
20        if (i == 0) {
21            monthWithHighest = 0;
22            monthWithLowest = 0;
23        } else {
24            if (rainfall[i] > rainfall[monthWithHighest]) {
25                monthWithHighest = i;
26            }
27            if (rainfall[i] < rainfall[monthWithLowest]) {
28                monthWithLowest = i;
29            }
30        }
31    }
32
33    averageRainfall = totalRainfall / MONTHS;
34    cout << "Total rainfall for the year: " << totalRainfall << " inches" << endl;
35    cout << "Average monthly rainfall: " << averageRainfall << " inches" << endl;
36    cout << "Month with highest rainfall: Month " << (monthWithHighest + 1) << " with " <<
    rainfall[monthWithHighest] << " MM" << endl;
37    cout << "Month with lowest rainfall: Month " << (monthWithLowest + 1) << " with " <<

```

Output:

```

Enter the total rainfall for each of the 12 months (in MM):
Month 1: 12
Month 2: 131
Month 3: 2
Month 4: 122
Month 5: 144
Month 6: 167
Month 7: 122
Month 8: 231
Month 9: 324
Month 10: 5543
Month 11: 122
Month 12: 187
Total rainfall for the year: 6889 inches
Average monthly rainfall: 582.417 inches
Month with highest rainfall: Month 10 with 5543 MM
Month with lowest rainfall: Month 3 with 2 MM

--- Code Execution Successful ---

```



```
//*****THE END*****
```

```
//*****QUESTION#5*****
```

```
#include <iostream>
```

```
using namespace std;
```

```
const int ROWS = 3;
```

```
const int COLS = 4;
```

```
int getTotal(int arr[ROWS][COLS]) {
```

```
    int total = 0;
```

```
    for (int i = 0; i < ROWS; i++) {
```

```
        for (int j = 0; j < COLS; j++) {
```

```
            total += arr[i][j];
```

```
        }
```

```
    }
```

```
    return total;
```

```
}
```

```
double getAverage(int arr[ROWS][COLS]) {
```

```
    int total = getTotal(arr);
```

```
    return (double)total / (ROWS * COLS);
```

```
}
```

```
int getRowTotal(int arr[ROWS][COLS], int row) {  
    int total = 0;  
    for (int j = 0; j < COLS; j++) {  
        total += arr[row][j];  
    }  
    return total;  
}
```

```
int getColumnTotal(int arr[ROWS][COLS], int col) {  
    int total = 0;  
    for (int i = 0; i < ROWS; i++) {  
        total += arr[i][col];  
    }  
    return total;  
}
```

```
int getHighestInRow(int arr[ROWS][COLS], int row) {  
    int highest = arr[row][0];  
    for (int j = 1; j < COLS; j++) {  
        if (arr[row][j] > highest) {  
            highest = arr[row][j];  
        }  
    }  
    return highest;  
}
```

```

int getHighestInColumn(int arr[ROWS][COLS], int col) {
    int highest = arr[0][col];
    for (int i = 1; i < ROWS; i++) {
        if (arr[i][col] > highest) {
            highest = arr[i][col];
        }
    }
    return highest;
}

```

```

int main() {
    int data[ROWS][COLS] = {
        {1, 2, 3, 4},
        {5, 6, 7, 8},
        {9, 10, 11, 12}
    };

    cout << "Total of all elements: " << getTotal(data) << endl;
    cout << "Average of all elements: " << getAverage(data) << endl;

    int row;
    cout << "Enter row number (0 to " << ROWS - 1 << ") to get row total: ";
    cin >> row;
    if (row >= 0 && row < ROWS) {
        cout << "Total of row " << row << ": " << getRowTotal(data, row) << endl;
    } else {
        cout << "Invalid row number." << endl;
    }
}

```

```
}
```

```
int col;
```

```
cout << "Enter column number (0 to " << COLS - 1 << ") to get column total: ";
```

```
cin >> col;
```

```
if (col >= 0 && col < COLS) {
```

```
    cout << "Total of column " << col << ": " << getColumnTotal(data, col) << endl;
```

```
} else {
```

```
    cout << "Invalid column number." << endl;
```

```
}
```

```
cout << "Enter row number (0 to " << ROWS - 1 << ") to get highest value in row: ";
```

```
cin >> row;
```

```
if (row >= 0 && row < ROWS) {
```

```
    cout << "Highest value in row " << row << ": " << getHighestInRow(data, row) << endl;
```

```
} else {
```

```
    cout << "Invalid row number." << endl;
```

```
}
```

```
cout << "Enter column number (0 to " << COLS - 1 << ") to get highest value in column: ";
```

```
cin >> col;
```

```
if (col >= 0 && col < COLS) {
```

```
    cout << "Highest value in column " << col << ": " << getHighestInColumn(data, col) << endl;
```

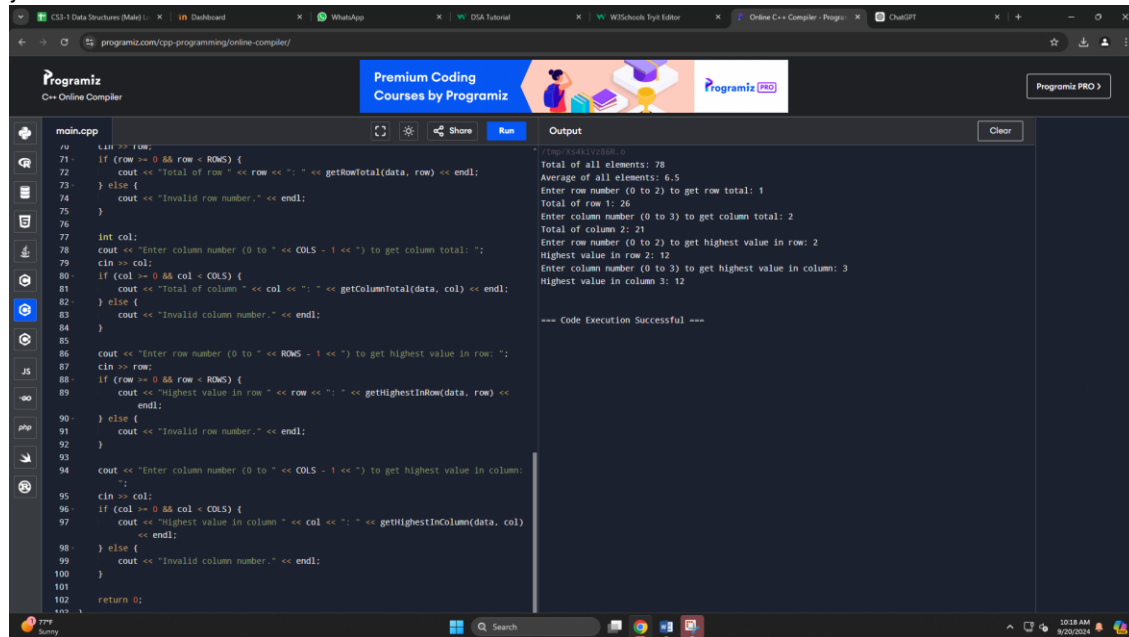
```
} else {
```

```
    cout << "Invalid column number." << endl;
```

```
}
```

```
return 0;
```

```
}
```



The screenshot shows the Programiz C++ Online Compiler interface. The code editor on the left contains a C++ program that calculates the total, average, and highest values for a 3x3 matrix. The output window on the right shows the results of the program execution, which are: Total of all elements: 78, Average of all elements: 6.5, Enter row number (0 to 2) to get row total: 1, Total of row 1: 26, Enter column number (0 to 3) to get column total: 2, Total of column 2: 21, Enter row number (0 to 2) to get highest value in row: 2, Highest value in row 2: 12, Enter column number (0 to 3) to get highest value in column: 3, Highest value in column 3: 12. The status bar at the bottom indicates "Code Execution Successful".

```
//*****THE END*****
```

```
//*****QUESTION#6*****
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int n;
```

```
    cout << "Enter the number of elements: ";
```

```
    cin >> n;
```

```
    int* arr = new int[n];
```

```
    cout << "Enter " << n << " integers: " << endl;
```

```

for (int i = 0; i < n; ++i) {

    cin >> arr[i];

}

```

```

int sumOdd = 0;

for (int i = 0; i < n; ++i) {

    if (arr[i] % 2 != 0) {

        sumOdd += arr[i];

    }

}

```

```

cout << "Sum of odd integers: " << sumOdd << endl;

```

```

delete[] arr;

```

```

return 0;

```

```

}

```

The screenshot shows the Programiz Online C++ Compiler interface. The code editor on the left contains the following C++ code:

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int n;
6     cout << "Enter the number of elements: ";
7     cin >> n;
8
9     int* arr = new int[n];
10    cout << "Enter " << n << " integers: " << endl;
11    for (int i = 0; i < n; ++i) {
12        cin >> arr[i];
13    }
14
15    int sumOdd = 0;
16    for (int i = 0; i < n; ++i) {
17        if (arr[i] % 2 != 0) {
18            sumOdd += arr[i];
19        }
20    }
21
22    cout << "Sum of odd integers: " << sumOdd << endl;
23
24    delete[] arr;
25    return 0;
26 }
27
28

```

The output window on the right shows the following output:

```

Enter the number of elements: 5
Enter 5 integers:
3
4
5
9
7
Sum of odd integers: 24
--- Code Execution Successful ---

```

The browser tabs at the top include "CS3-1 Data Structures (Maid)", "Dashboard", "WhatsApp", "DSA Tutorial", "W3Schools Tryit Editor", "Online C++ Compiler - Programiz", and "ChatGPT". The Programiz logo and "Premium Coding Courses by Programiz" banner are visible at the top of the compiler interface.

```
//*****THE END*****
```

```
//*****QUESTION#7*****
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int value;
```

```
    value = 42;
```

```
    int* ptr;
```

```
    ptr = &value;
```

```
    cout << "Value: " << *ptr << endl;
```

```
    return 0;
```

```
}
```

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int value;
6     value = 42;
7     int* ptr;
8     ptr = &value;
9
10    cout << "Value: " << *ptr << endl;
11    return 0;
12 }
13
14
```

Output

Value: 42

=== Code Execution Successful ===

//*****THE END*****

//*****QUESTION#8*****

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int a;
```

```
    int b;
```



```
cout << "Enter integer for  
a: ";
```

```
cin >> a;
```

```
cout << "Enter integer for  
b: ";
```

```
cin >> b;
```

```
int* ptrA;
```

```
int* ptrB;
```

```
ptrA = &a;
```

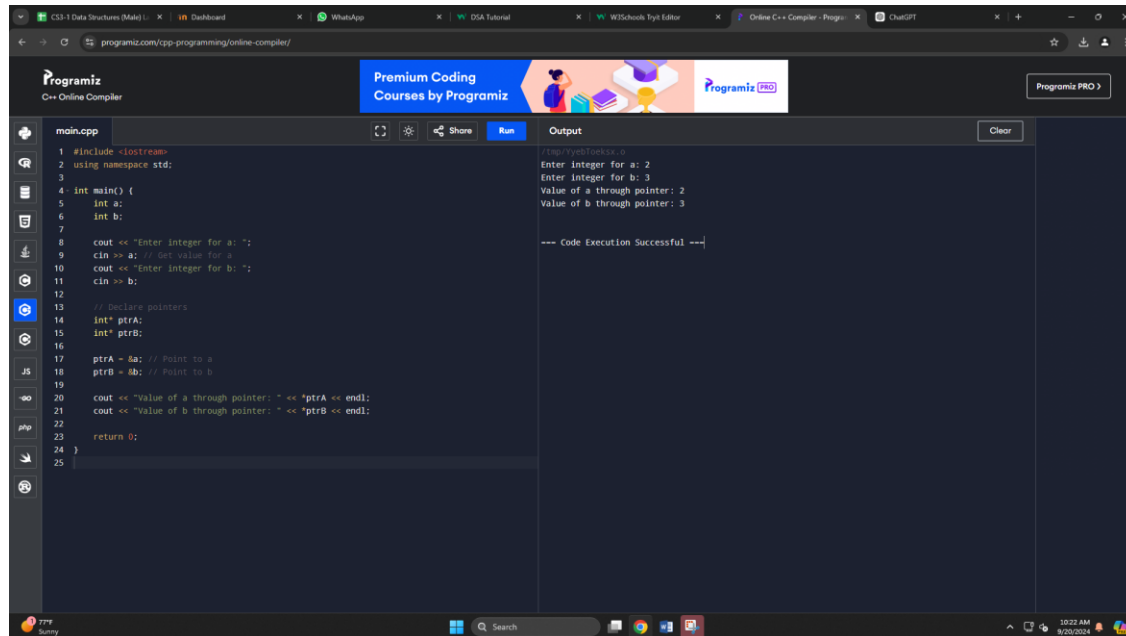
```
ptrB = &b;
```

```
cout << "Value of a  
through pointer: " << *ptrA  
<< endl;
```

```
cout << "Value of b  
through pointer: " << *ptrB  
<< endl;
```

```
return 0;
```

```
}
```



//*****question#9*****

```
#include <iostream>
using namespace std;
void Menu() {
    int choice, a, b;

    do {
        cout << "Calculator Menu:\n";
        cout << "1. Addition\n";
        cout << "2. Subtraction\n";
        cout << "3. Division\n";
        cout << "4. Multiplication\n";
        cout << "5. Power\n";
        cout << "6. Exit\n";
        cout << "Enter your choice: ";
        cin >> choice;
        if (choice >= 1 && choice <= 5) {
            cout << "Enter two integers: ";
            cin >> a >> b;
        }
        switch (choice) {
            case 1:
                cout << "Result: " << (a + b) << endl;
                break;
```

```

case 2:
cout << "Result: " << (a - b) << endl;
break;

case 3:
if (b != 0)
cout << "Result: " << (static_cast<double>(a) / b) << endl;
else
cout << "Error: Division by zero" << endl;
break;
case 4:
cout << "Result: " << (a * b) << endl;
break;
case 5: {
int pow = 1;
for (int i = 0; i < b; ++i)
pow *= a;
cout << "Result: " << pow << endl;
break;
}
case 6:
cout << "Exiting...\n";
break;
default:
cout << "Invalid choice\n";
}
} while (choice != 6);
}

int main() {
Menu();
return 0;
}

```

CSS-1 Data Structures (Madi)DashboardWhatsAppDish TutorialW3Schools TutorialsOnline C++ Compiler - ProgramizChatGPT

programiz.com/cpp-programming/online-compiler/

ProgramizC++ Online Compiler

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main.cpp

21 switch (choice) {
22 case 1:
23 cout << "Result: " << (a + b) << endl;
24 break;
25 case 2:
26 cout << "Result: " << (a - b) << endl;
27 break;
28
29 case 3:
30 if (b != 0)
31 cout << "Result: " << (static_cast<double>(a) / b) << endl;
32 else
33 cout << "Error: Division by zero" << endl;
34 break;
35 case 4:
36 cout << "Result: " << (a * b) << endl;
37 break;
38 case 5: {
39 int pow = 1;
40 for (int i = 0; i < b; ++i)
41 pow *= a;
42 cout << "Result: " << pow << endl;
43 break;
44 }
45 case 6:
46 cout << "Exiting...\n";
47 break;
48 default:
49 cout << "Invalid choice\n";
50 }
51 } while (choice != 6);
52 }
53 int main() {
54 Menu(); // call the menu function
55 return 0;
56 }

ShareRunClear

Output

Calculator Menu:
1. Addition
2. Subtraction
3. Division
4. Multiplication
5. Power
6. Exit
Enter your choice: 1
Enter two integers: 1
3
Result: 4
Calculator Menu:
1. Addition
2. Subtraction
3. Division
4. Multiplication
5. Power
6. Exit
Enter your choice: 6
Exiting...

=== Code Execution Successful ===

1023 AM
9/20/2024