

Fundamentals of Programming

Lab Report 01

1st SEMESTER



Session: ME-15

Section: C

ABDUL RAFEH

417648

School of Mechanical and Manufacturing Engineering

MANUAL 1

LAB TASK:

1. Write a program in C++ to convert temperature in Fahrenheit to Celsius.

```
1 #include <iostream>
2 #include <math.h>
3
4 using namespace std;
5
6
7 int main() {
8     float x1, y1, x2, y2, distance;
9
10    cout << "Enter the coordinates of the first point: ";
11    cin >> x1 >> y1;
12    cout << "Enter the coordinates of the second point: ";
13    cin >> x2 >> y2;
14    float dx = x2 - x1;
15    float dy = y2 - y1;
16    distance=(dx*dx + dy*dy);
17    cout << "The distance between the two points is: " << distance << endl;
18
19    return 0;
20 }
```

Enter the coordinates of the first point: 4
7
Enter the coordinates of the second point: 8
4
The distance between the two points is: 25

Process exited after 7.58 seconds with return value 0
Press any key to continue . . .

2. Write a code in C++ to take length from user in centimeter and convert it into meter and kilometer

The screenshot shows the Embarcadero Dev-C++ 6.3 IDE. The main editor window displays a C++ program in a file named 'ez 1.cpp'. The code is as follows:

```
21 #include <iostream>
22
23 using namespace std;
24
25 int main() {
26     float cm, meter, kilometer;
27
28     cout << "Enter the length in centimeter: ";
29     cin >> cm;
30
31     meter = cm / 100.0;
32     kilometer = cm / 100000.0;
33
34     cout << "The length in meter is: " << meter << " m" << endl;
35     cout << "The length in kilometer is: " << kilometer << " km" << endl;
36
37     return 0;
38 }
39 /*#include <iostream>
```

Below the editor, the 'Compiler (23)' window shows a message:

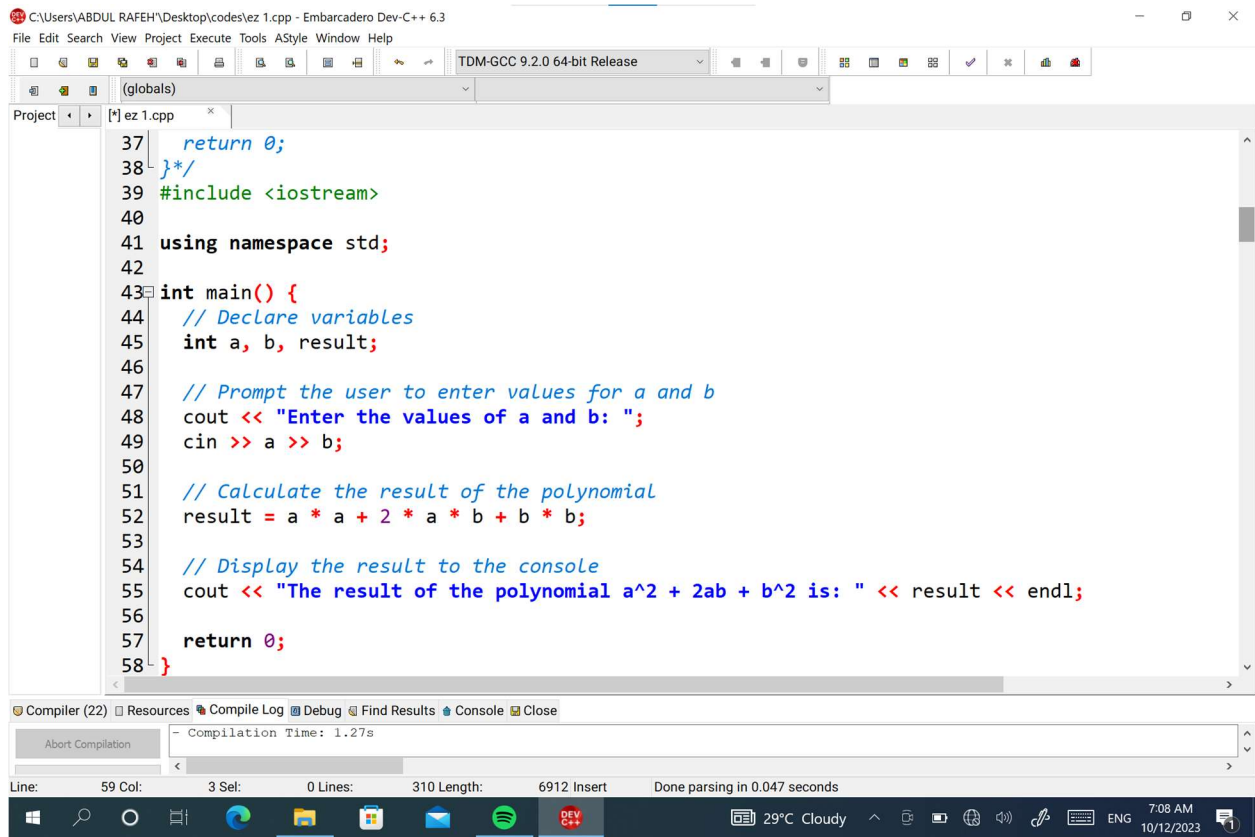
| Line | Col | File | Message |
|------|-----|---|--------------------------------------|
| 43 | 5 | C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.cpp | [Error] redefinition of 'int main()' |

The status bar at the bottom indicates 'Done parsing in 0.046 seconds'. The Windows taskbar at the very bottom shows the date and time as 7:05 AM on 10/12/2023.

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter the length in centimeter: 76
The length in meter is: 0.76 m
The length in kilometer is: 0.00076 km

-----
Process exited after 5.368 seconds with return value 0
Press any key to continue . . .
```

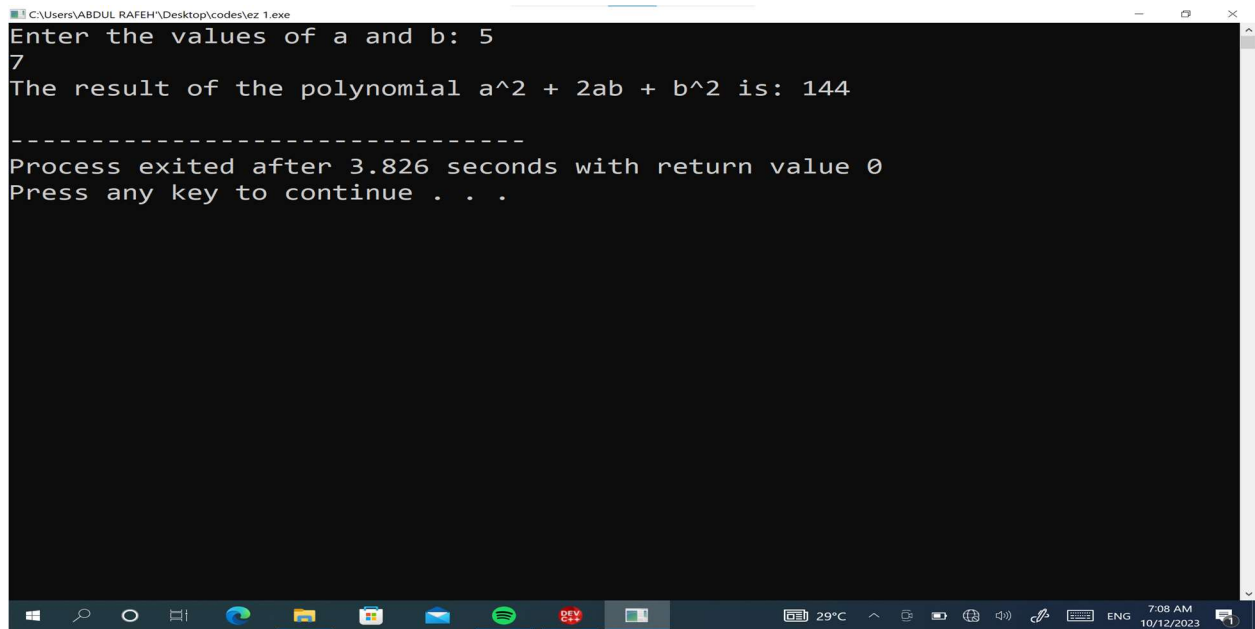
3. Write a code in C++ that takes values of a and b from the user and displays result of polynomial $a^2 + 2ab + b^2$.



The screenshot shows the Embarcadero Dev-C++ IDE with a C++ program open in the editor. The program calculates the result of the polynomial $a^2 + 2ab + b^2$ for given values of a and b . The code is as follows:

```
37 return 0;
38 }*/
39 #include <iostream>
40
41 using namespace std;
42
43 int main() {
44     // Declare variables
45     int a, b, result;
46
47     // Prompt the user to enter values for a and b
48     cout << "Enter the values of a and b: ";
49     cin >> a >> b;
50
51     // Calculate the result of the polynomial
52     result = a * a + 2 * a * b + b * b;
53
54     // Display the result to the console
55     cout << "The result of the polynomial a^2 + 2ab + b^2 is: " << result << endl;
56
57     return 0;
58 }
```

The IDE interface includes a menu bar (File, Edit, Search, View, Project, Execute, Tools, AStyle, Window, Help), a toolbar, and a status bar at the bottom showing system information like temperature (29°C) and time (7:08 AM, 10/12/2023).



The screenshot shows the console output of the program. The user enters the values 5 and 7 for a and b respectively. The program outputs the result of the polynomial calculation. The console text is as follows:

```
Enter the values of a and b: 5
7
The result of the polynomial a^2 + 2ab + b^2 is: 144
-----
Process exited after 3.826 seconds with return value 0
Press any key to continue . . .
```

The console window title is "C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe". The status bar at the bottom of the window shows the same system information as the IDE screenshot above.

4. . Write a program in C++ to convert temperature in Fahrenheit to Celsius.

C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.cpp - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 9.2.0 64-bit Release

(globals)

Project ez 1.cpp

```
57 return 0;
58 }*/
59 #include <iostream>
60
61 using namespace std;
62
63 int main() {
64     // Declare variables
65     float fahrenheit, celsius;
66
67     // Prompt the user to enter the temperature in Fahrenheit
68     cout << "Enter the temperature in Fahrenheit: ";
69     cin >> fahrenheit;
70
71     // Calculate the temperature in Celsius
72     celsius = (fahrenheit - 32) * 5 / 9;
73
74     // Display the temperature in Celsius to the console
75     cout << "The temperature in Celsius is: " << celsius << endl;
76
77     return 0;
78 }
```

Compiler (22) Resources Compile Log Debug Find Results Console Close

Compilation Time: 1.24s

Line: 79 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds

29°C Cloudy 7:11 AM 10/12/2023

C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe

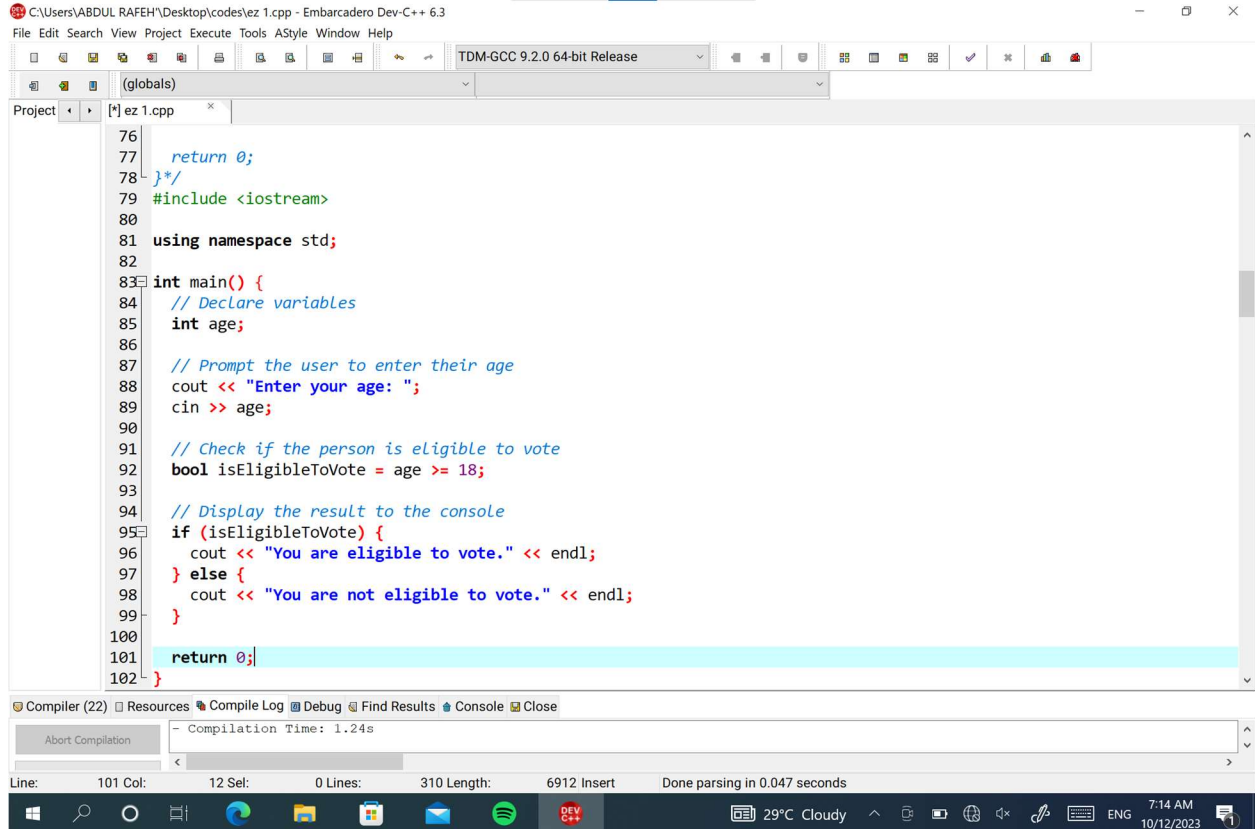
```
Enter the temperature in Fahrenheit: 156
The temperature in Celsius is: 68.8889

-----
Process exited after 6.232 seconds with return value 0
Press any key to continue . . .
```

29°C 7:10 AM 10/12/2023

LAB MANUAL 2:

5. Write a program that determines if a person is eligible to vote based on their age (e.g., 18 years or older) using logical operators.



The screenshot shows the Embarcadero Dev-C++ 6.3 IDE. The main window displays a C++ program named 'ez 1.cpp'. The code is as follows:

```
76
77     return 0;
78 }*/
79 #include <iostream>
80
81 using namespace std;
82
83 int main() {
84     // Declare variables
85     int age;
86
87     // Prompt the user to enter their age
88     cout << "Enter your age: ";
89     cin >> age;
90
91     // Check if the person is eligible to vote
92     bool isEligibleToVote = age >= 18;
93
94     // Display the result to the console
95     if (isEligibleToVote) {
96         cout << "You are eligible to vote." << endl;
97     } else {
98         cout << "You are not eligible to vote." << endl;
99     }
100
101     return 0;
102 }
```

The bottom of the IDE shows the 'Compiler (22)' window with the message 'Compilation Time: 1.24s'. The status bar at the bottom indicates 'Line: 101 Col: 12 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds'. The Windows taskbar at the very bottom shows the date and time as 7:14 AM on 10/12/2023.

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter your age: 32
You are eligible to vote.

-----
Process exited after 5.348 seconds with return value 0
Press any key to continue . . .
```

6. Write a program that takes an integer as input and checks if it falls within the range [10, 50] using logical operators.

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.cpp - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 9.2.0 64-bit Release
(globals)
Project | ez 1.cpp
100
101     return 0;
102 */
103 #include <iostream>
104
105 using namespace std;
106
107 int main() {
108     // Declare variables
109     int number;
110
111     // Prompt the user to enter a number
112     cout << "Enter a number: ";
113     cin >> number;
114
115     // Check if the number falls within the range [10, 50]
116     bool isWithinRange = (number >= 10 && number <= 50);
117
118     // Display the result to the console
119     if (isWithinRange) {
120         cout << "The number is within the range [10, 50]." << endl;
121     } else {
122         cout << "The number is not within the range [10, 50]." << endl;
123     }
124
125     return 0;
126 }
```

Compiler (22) | Resources | Compile Log | Debug | Find Results | Console | Close

Compilation Time: 1.17s

Line: 127 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.032 seconds


```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter a number: 45
The number is within the range [10, 50].

-----
Process exited after 2.728 seconds with return value 0
Press any key to continue . . .
```

7. Write a C++ program to compare two integers and find the maximum value

C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.cpp - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 9.2.0 64-bit Release

(globals)

Project ez 1.cpp

```
126- */
127 #include <iostream>
128
129 using namespace std;
130
131 int main() {
132     // Declare variables
133     int number1, number2, maximum;
134
135     // Prompt the user to enter two numbers
136     cout << "Enter two numbers: ";
137     cin >> number1 >> number2;
138
139     // Compare the two numbers and find the maximum
140     if (number1 >= number2) {
141         cout<<"maximum = "<<number1;
142     } else {
143         cout<<"maximum = "<<number2;
144     }
145 }
```

Compiler (22) Resources Compile Log Debug Find Results Console Close

Compilation Time: 1.13s

Line: 146 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.046 seconds

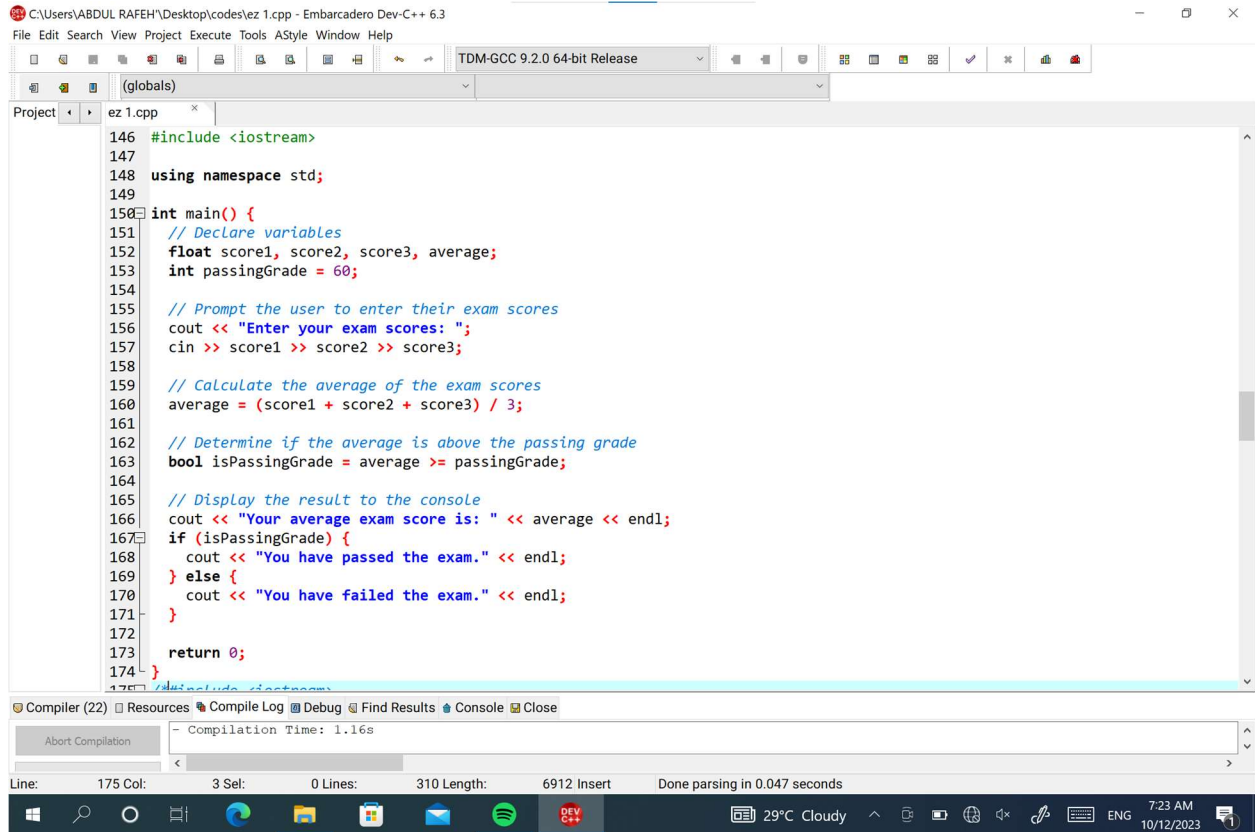
29°C Cloudy 7:18 AM 10/12/2023

C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.exe

```
Enter two numbers: 4
45
maximum = 45
-----
Process exited after 6.617 seconds with return value 0
Press any key to continue . . .
```

29°C 7:19 AM 10/12/2023

8. Write a C++ program to calculate the average of three exam scores and determine if it's above a passing grade (e.g., average ≥ 60)



```
146 #include <iostream>
147
148 using namespace std;
149
150 int main() {
151     // Declare variables
152     float score1, score2, score3, average;
153     int passingGrade = 60;
154
155     // Prompt the user to enter their exam scores
156     cout << "Enter your exam scores: ";
157     cin >> score1 >> score2 >> score3;
158
159     // Calculate the average of the exam scores
160     average = (score1 + score2 + score3) / 3;
161
162     // Determine if the average is above the passing grade
163     bool isPassingGrade = average >= passingGrade;
164
165     // Display the result to the console
166     cout << "Your average exam score is: " << average << endl;
167     if (isPassingGrade) {
168         cout << "You have passed the exam." << endl;
169     } else {
170         cout << "You have failed the exam." << endl;
171     }
172
173     return 0;
174 }
175 #include <iostream>
```

Compiler (22) | Resources | Compile Log | Debug | Find Results | Console | Close

Compilation Time: 1.16s

Line: 175 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds

29°C Cloudy 7:23 AM 10/12/2023

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter your exam scores: 54
87
75
Your average exam score is: 72
You have passed the exam.

-----
Process exited after 7.873 seconds with return value 0
Press any key to continue . . .
```

9. Create a program that takes a student's score as input and assigns a grade based on predefined criteria using logical operators (e.g., A, B, C, D, F). A-Grade: 90-100 Marks B-Grade: 75-90 Marks C-Grade: 60-75 Marks D-Grade: 45-60 Marks F-Grade: 0-45 Mark

C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.cpp - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 9.2.0 64-bit Release

(globals)

Project ez 1.cpp

```
173     return 0;
174 }*/
175 #include <iostream>
176
177 using namespace std;
178
179 int main() {
180     // Declare variables
181     int score, grade;
182
183     // Prompt the user to enter the student's score
184     cout << "Enter the student's score: ";
185     cin >> score;
186
187     // Assign the grade based on the student's score
188     if (score >= 90 && score <= 100) {
189         cout<<"grade = 'A'";
190     } else if (score >= 75 && score < 90) {
191         cout<<"grade = 'B'";
192     } else if (score >= 60 && score < 75) {
193         cout<<"grade = 'C'";
194     } else if (score >= 45 && score < 60) {
195         cout<<"grade = 'D'";
196     } else {
197         cout<<"grade = 'F'";
198     }
199     return 0;
200 }
201 */#include <iostream>
202
```

Compiler (22) Resources Compile Log Debug Find Results Console Close

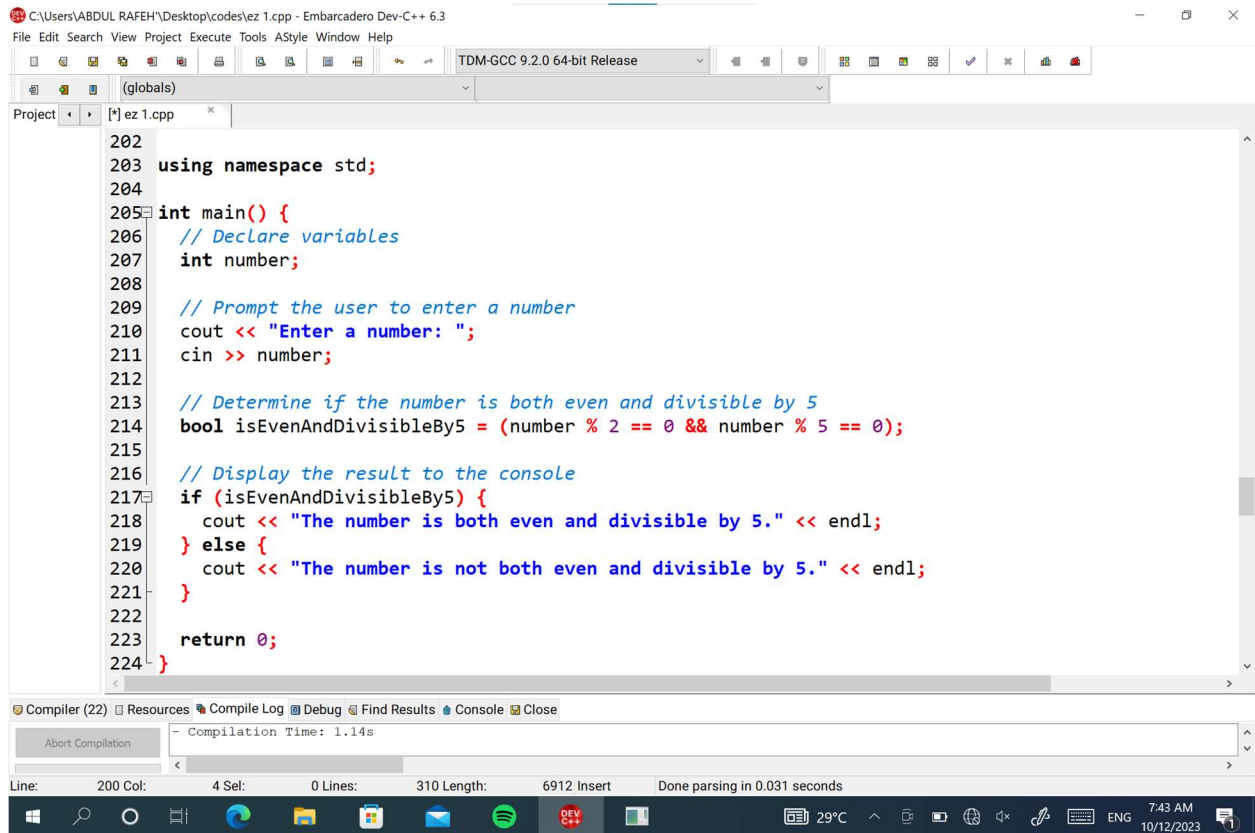
Compilation Time: 1.20s

Line: 201 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds

C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe

```
Enter the student's score: 87
grade = 'B'
-----
Process exited after 4.682 seconds with return value 0
Press any key to continue . . .
```

10. Write a program that takes an integer as input and determines if it is both even and divisible by 5.



The screenshot shows a C++ program in an IDE. The program prompts the user to enter a number and then checks if the number is both even and divisible by 5. The code is as follows:

```
202
203 using namespace std;
204
205 int main() {
206     // Declare variables
207     int number;
208
209     // Prompt the user to enter a number
210     cout << "Enter a number: ";
211     cin >> number;
212
213     // Determine if the number is both even and divisible by 5
214     bool isEvenAndDivisibleBy5 = (number % 2 == 0 && number % 5 == 0);
215
216     // Display the result to the console
217     if (isEvenAndDivisibleBy5) {
218         cout << "The number is both even and divisible by 5." << endl;
219     } else {
220         cout << "The number is not both even and divisible by 5." << endl;
221     }
222
223     return 0;
224 }
```

The IDE interface includes a menu bar (File, Edit, Search, View, Project, Execute, Tools, AStyle, Window, Help), a toolbar, and a status bar at the bottom showing line and column numbers, selection information, and system details (29°C, 7:43 AM, 10/12/2023).

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter a number: 54
The number is not both even and divisible by 5.

-----
Process exited after 3.893 seconds with return value 0
Press any key to continue . . .
```

11. Create a C++ program that checks if a user-provided year is a leap year

C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.cpp - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 9.2.0 64-bit Release

(globals)

Project ez 1.cpp

```
224 }*/
225 #include <iostream>
226
227 using namespace std;
228
229 int main() {
230     // Declare variables
231     int year;
232
233     // Prompt the user to enter a year
234     cout << "Enter a year: ";
235     cin >> year;
236
237     // Check if the year is a leap year
238     bool isLeapYear = (year % 4 == 0 && year % 100 != 0) || year % 400 == 0;
239
240     // Display the result to the console
241     if (isLeapYear) {
242         cout << "The year " << year << " is a leap year." << endl;
243     } else {
244         cout << "The year " << year << " is not a leap year." << endl;
245     }
246
247     return 0;
248 }
```

Compiler (22) Resources Compile Log Debug Find Results Console Close

Compilation Time: 1.33s

Line: 249 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds

29°C Cloudy 7:32 AM 10/12/2023

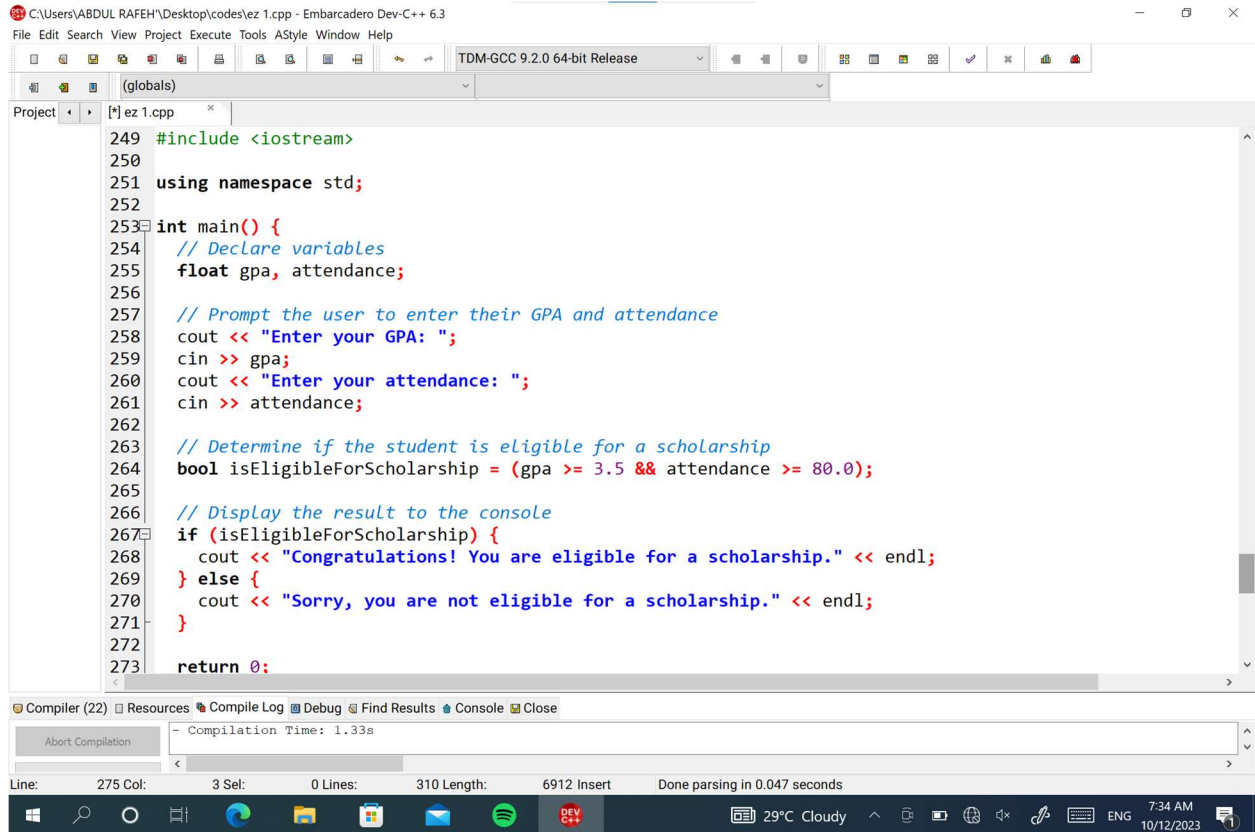
C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.exe

```
Enter a character: e
The character e is a vowel.

-----
Process exited after 2.573 seconds with return value 0
Press any key to continue . . .
```

29°C 7:37 AM 10/12/2023

12. Create a C++ program that determines if a student is eligible for a scholarship based on their GPA (must have GPA ≥ 3.5) and attendance (must have attended at least 80% of classes)



The screenshot shows a C++ program in an IDE. The program prompts the user for GPA and attendance, then checks if the student is eligible for a scholarship based on the criteria: GPA ≥ 3.5 and attendance $\geq 80\%$. The code is as follows:

```
249 #include <iostream>
250
251 using namespace std;
252
253 int main() {
254     // Declare variables
255     float gpa, attendance;
256
257     // Prompt the user to enter their GPA and attendance
258     cout << "Enter your GPA: ";
259     cin >> gpa;
260     cout << "Enter your attendance: ";
261     cin >> attendance;
262
263     // Determine if the student is eligible for a scholarship
264     bool isEligibleForScholarship = (gpa >= 3.5 && attendance >= 80.0);
265
266     // Display the result to the console
267     if (isEligibleForScholarship) {
268         cout << "Congratulations! You are eligible for a scholarship." << endl;
269     } else {
270         cout << "Sorry, you are not eligible for a scholarship." << endl;
271     }
272
273     return 0;
}
```

The IDE interface includes a menu bar (File, Edit, Search, View, Project, Execute, Tools, AStyle, Window, Help), a toolbar, a project explorer showing 'ez 1.cpp', a compiler window with 'Compilation Time: 1.33s', and a status bar at the bottom showing 'Line: 275 Col: 3 Sel: 0 Lines: 310 Length: 6912 Insert Done parsing in 0.047 seconds'. The Windows taskbar at the bottom shows the time as 7:34 AM on 10/12/2023.

```
C:\Users\ABDUL RAFEH\Desktop\codes\ez 1.exe
Enter your GPA: 3.6
Enter your attendance: 83
Congratulations! You are eligible for a scholarship.

-----
Process exited after 14.9 seconds with return value 0
Press any key to continue . . .
```

13. Write a program that checks if a given character is a vowel (a, e, i, o, u) or a consonant using logical operators

C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.cpp - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 9.2.0 64-bit Release

(globals)

Project [ez 1.cpp x]

```
270     cout << "Sorry, you are not eligible for a scholarship." << endl;
271 }
272
273 return 0;
274 }*/
275 #include <iostream>
276
277 using namespace std;
278
279 int main() {
280     // Declare variables
281     char character;
282
283     // Prompt the user to enter a character
284     cout << "Enter a character: ";
285     cin >> character;
286
287     // Check if the character is a vowel
288     bool isVowel = (character == 'a' || character == 'e' || character == 'i' || character == 'o' || character == 'u');
289
290     // Display the result to the console
291     if (isVowel) {
292         cout << "The character " << character << " is a vowel." << endl;
293     } else {
294         cout << "The character " << character << " is a consonant." << endl;
295     }
296
297     return 0;
298 }
```

Compiler (22) Resources Compile Log Debug Find Results Console Close

Compilation Time: 1.22s

Line: 298 Col: 2 Sel: 0 Lines: 310 Length: 6908 Insert Done parsing in 0.032 seconds

C:\Users\ABDUL RAFEH\Desktop\codes\vez 1.exe

```
Enter a character: e
The character e is a vowel.

-----
Process exited after 2.573 seconds with return value 0
Press any key to continue . . .
```

