Homework 9: Introduction to C++

Here are a few exercises to familiarize yourself with C++ . You will not need to submit those, but should definitely try all of them and ask questions if you have any trouble. You can access the replit C++ template at https://replit.com/@jeromebuerki/162-C-template.

Problem 1

Type the source code from lecture notes 9, reproduced below, in a text file, save it as `Area.cpp`, compile it, and run it.

Please do not just cut and paste, but type it yourself. You'll learn much more about what to be careful about this way.

Again, the line numbers are just there for convenience, and should not be typed into the source code.

Area-using.cpp

```
1  #include <cstdlib>
2  #include <iostream>
3  #include <iomanip>
4  #include <cmath>
5
6  using std::cin;
7  using std::cout;
8  using std::endl;
9
10 constexpr double PI = std::acos(-1);
11
12 int main(int argc, char** argv)
13 {
14   double radius, circum, area;
15
16   cout << "pi = " << std::setprecision(16) << PI << endl;
17
18   cout << "Enter a radius in meters: ";
19   cin >> radius;
20
21   circum = 2.*PI*radius;
22   area = PI*pow(radius,2);
23
24   cout << "Radius: " << radius << " m" << endl;
25   cout << "Circumference: " << circum << " m" << endl;
26   cout << "Area: " << area << " m^2" << endl;
27
28   return EXIT_SUCCESS;
29 }  // end main
```

Problem 2

Once your program is working, try and modify it to introduce various types of errors on purpose and compile to see what kind of error messages the compiler gives.

Before doing that, make a copy of your working program, for example called `Area-wrong.cpp` and work on that copy rather than the original.

Try the following errors one at a time and explain what you observe (using comments within the file) in each case:

- Try and introduce spelling errors in various keywords, such as `include`, `using`, `double`, `cout`, ...
- Try and introduce spelling errors in one variable name, either in its declaration or when it is used (but not both)
- Try removing various symbols, such as a comma, star, or semicolon in various places and compile each time.
- Try changing the name of the `main` function and see what happens
- Try removing one of the `include` statements
- Try removing one of the `using` statements
- Try removing the `return` statement (might not break anything)
- Try getting rid of the curly brackets
- Replace `double` by `int`, compile and run the program. What difference do you notice?

Problem 3

Write another program similar to `Area.cpp` that will ask for a radius, calculate the volume ($V = 4/3\pi R^3$) and surface area ($A = 4\pi R^2$) of a sphere of that radius, and print the results to the screen.

Make sure that the result is correct!