Assignment 1 (80 Points)
Due on October 27

Problem 1: Calculator (40 pts)

For this problem, you will create a C++ console app, where you will ask the user to input a problem that they would like to solve. The calculator must be able to support order of operation problems as well as regular arithmetic problems. The way the program should run is by asking the user to enter the problem that they would like to solve. Please note that this program must accept int and float values. From there, you will use <string> library to search throughout the string as character to find int value and operators. You can either use find() function or the for loop to perform search on an operator, while you can use isDigit() and if statement to find digit values and decimal points.

The syntax for find function is:

- **stringVariable.find("operator goes here");**

The syntax for determining digits:

- **if(isDigit(i)) {}**

As you are searching for an operator, please note the following order that you would have to perform to do the search:

- Parenthesis
    - Parenthesis
    - Exponents
    - Multiplication or Division from left to right
    - Addition or Subtraction from left to right
- Exponents
- Multiplication or Division from left to right
- Addition or Subtraction from left to right

You should utilize functions for every step that are outlined above and for the sub-bullet points, these are a function call that you should invoke inside Parenthesis function to do the search, but keep in mind that you should also create a variable that will keep track of your search.

When the operator is found, it will return the index number regarding where the operator is located at. Go ahead and save that index number to 2 variables, which one variable will be to determine where it starts, and another variable will be to determine where it ends.

If you are doing a search in a parenthesis, keep track of where it starts and where it ends and then from there, paste the number that needs to be solved on a new string or you can create a substring and paste it there and solve the problem. Keep in mind that it needs to be one operation at a time so have 2 to 3 substrings which will be reserved for the problem that you are currently solving, the string before the procedure that you took to solve and the string after the procedure that you took to solve. Once you solve the problem, you can concatenate the string with the answer and then perform the search again to find if there are any remaining operators. If you finish solving all the problems in the parenthesis of if you have taken an exponent, you can remove them from the problem.

The syntax for substring:
string newString = stringName.substr(index number to start, how many characters to copy)

Format for concatenating strings:
string problem = preProblem + currentProblem + afterProblem

After concatenating the strings back together with the problem, you will need to perform the search again to find the remaining operators. Keep in mind that you should have a bool variable that will determine if it is done searching for the current operators. By default, it should be false, but if the whole search for an operator is finished, that should be changed to true and then move on to another operator search and do the same for the remainder of the operator.

Please note that you also must show your work in the console app as the purpose of this app would be for elementary school students who needs an offline calculator apps to be able to solve arithmetic and order of operation problems.

After performing the search of all the operators, display an output saying the final answer to the problem. And then ask the user to see if they would like to solve another problem. If that is the case, then the whole procedure of the program will

restart, and you can enter another problem to solve. If that is not the case, the program will output thanking the user for using the program and then quit.

EX:
Enter a problem to solve: **(3 * 5^2 / 15) – (5 – 2^2)**

Here are the steps:
(3 * 5^2 / 15) – (5 – 2^2)
(3 * 25 / 15) – (5 – 2^2)
(75/15) – (5 – 2^2)
5 – (5 – 2^2)
5 – (5 – 4)
5 – 1
4

The answer to this problem is 4.

Would you like to solve another problem? (Y/N) _____

If Y is chosen, restart the whole state of the program.

If N is chosen, output the following and then exit program:
Thank you for using this calculator!

Problem 2: Birthday Date Meaning Generator (20 pts)

For this problem, you will create a C++ console app, where you will ask the user for birthday date by month, day and year (2000-2023). From there, you will use the switch statement to distinguish the appropriate response and then from there, you will display the output and ask the user if they would like to enter another birthday using the while loop.

Day: https://www.numerology.com/articles/your-numerology-chart/birth-day-number/
Month: https://blog.onlineclock.net/months-days/
Year: https://www.wishafriend.com/astrology/birthyear/

EX:

Welcome to Birthday Date Meaning Generator!

Please enter the month of your birthday: ____

Please enter the day of your birthday: _____

Please enter the year of your birthday: _____

The month of **January** means Janus

The 1st of **January** means Self-Started

The year of 2000 means that you are millennial

Would you like to try another one? _____

(If N is typed) Thanks for playing!

Problem 3: BMI Calculator (20 pts)

Create a program that will ask the user to enter their name, age, gender (male/female), height by feet, height by inches and weight in pounds. Keep in mind that as you are entering the responses for every question, you will be saving each response to a variable, which will be used further in the program to calculate and display the output.

Upon answering all the questions, you will need to convert height by feet and height by inches to inches by using the following formula:
Inches = (height by feet * 12) + height by inches

When you get the inches, save that into a variable and then calculate BMI by using the following formula:

$$\boldsymbol{BMI = 703 * \frac{weight\ in\ pounds}{inches^2}}$$

When you get the BMI, save it into a variable and then use conditional statements to determine the status of BMI according to the BMI chart attached below:

Category	BMI range - kg/m^2
Severe Thinness	< 16
Moderate Thinness	16 - 17
Mild Thinness	17 - 18.5
Normal	18.5 - 25
Overweight	25 - 30
Obese Class I	30 - 35
Obese Class II	35 - 40
Obese Class III	> 40

After determining the status of BMI, then output the name, age, gender, height by feet, height by inches, weight in pounds, BMI and its meaning and then quit the program. (Refer to EX to see how it should be outputted)

EX:

//Ask the user questions

Please enter your name: _____
Please enter your age: _____
Please enter your Gender: _____
Please enter your height in feet: _____
Please enter your height in inches: _____
Please enter your weight in pounds: _____

//Process the responses

Inches = (height by ft) * 12 + height by in

$$BMI = 703 * \frac{weight}{inches^2}$$

//Output the following to console

Hi **(name)**,

You are a **(male/female)**. You are **(age)** years old. You are currently **(height in feet)**'**(height in inches)** and you currently weight **(weight)** pounds. Your BMI is **(BMI)**, which is **(meaning of BMI)**.

Thank you for using the BMI Calculator!

Deliverables:

- A zip file uploaded to Github consisting the following items:
  - C++ project (Can be altogether in its separate cpp files for all problems in this assignment or can be in separate projects as well for each problem)
  - Comments on your C++ source code
  - Readme.md in Github that will contain the following information:
    - Overview of your app (What is it, who is the intended audience, problem statement)
    - Features of the app
    - How to run the app
  - Your output