Instructions:

- Code the given questions in Visual Studio Editor.
- Use meaningful variable names and follow naming convention discussed in class.
- Your code should be understandable and readable.
- Any kind of Plagiarism wouldn't be tolerated.
- Submit your assignment on **16th September 2022 before 1:00 pm**. Any late submission wouldn't be accepted.

1) Write a program that prints *Bjarne* (creator of C++) on the console in the following manner:

```
BBBBBB     JJJJJ     AAAAA     RRRRR     N     N     EEEEE
B     B       J     A   A     R   R     NN    N     E
BBBBBB        J     AAAAA     RRRRR     N N   N     EEE
B     B  J    J     A   A     R R       N  N  N     E
BBBBBB     JJJJ      A   A     R   R     N   NN     EEEEE
```

2) Write a program that calculates the squares and cubes of the integers from 0 to 5 and uses tabs to print the following neatly formatted table of values:

integer	square	cube
0	0	0
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125

3) Write a program that stores a five-digit integer in a variable, separates the integer into its individual digits, and prints the digits separated from one another by three spaces each.

4) Write a program that plays a word game with the user. The program should ask the user to enter the following:

- His or her name
- His or her age
- The name of his city
- The name of his college
- His profession
- His pets name
- Animal type of his pet

After the user has entered these items, the program should display the following story, inserting the user's input into the appropriate place:

There once was a person named *NAME* who lived in *CITY*. At the age of *AGE*, *NAME* went to college at *COLLEGE*. *NAME* graduated from *COLLEGE* and went to work as a *PROFESSION*. Then, *NAME* adopted a(n) *ANIMAL* named *PETNAME*. They both lived happily ever after!

5) One metric ton is approximately 2205 pounds. Write a program that creates a variable, which stores any amount of rice, in pounds, in a bag. The program outputs the number of bags needed to store one metric ton of rice.

6) Write a program that computes the tax and tip on a restaurant bill for a customer with a $44.50 meal charge. The tax should be 6.75 percent of the meal cost. The tip should be 15 percent of the total after adding tax. Display the meal cost, tax amount, tip amount, and total bill on the screen.

7) Newton's law states that the force, F, between two bodies of masses M1 and M2 is given by:

$$F = k ((M_1M_2)/d^2)$$

In which k is the gravitational constant and d is the distance between the bodies. The value of k is approximately $6.67x10^{-8}$ dyn. cm^2/g^2. Write a program that stores the masses of bodies in variables and the distance between the bodies. The program then outputs the force between the bodies.

8) A soft drink company recently surveyed 12,467 of its customers and found that approximately 14 percent of those surveyed purchase one or more energy drinks per week. Of those customers who purchase energy drinks, approximately 64 percent of them prefer citrus-flavored energy drinks. Write a program that displays the following:

- The approximate number of customers in the survey who purchase one or more energy drinks per week
- The approximate number of customers in the survey who prefer citrus-flavored energy drinks

9) Write a C++ program that stores the elapsed time for an event in a variable. The program then outputs the elapsed time in hours, minutes, and seconds. (For example, if the elapsed time is 9630 seconds, then the output is 2:40:30)

10) Write a program that prompts the user to enter an alphabet in small caps (a, b, c, … … … z) and display the entered alphabet into its upper caps (A, B, C, … … … Z).

Sample Run:

Enter English Alphabet in Lower
Case: a
The Equivalent upper Case English
Alphabet: A

11) Write a program that reads in two variables and swaps the value of these variables. *You are not allowed to use any extra variable or +/- operator.*

12) Write a program, which calculates the following formula. The current in an alternating current circuit that contains resistance, capacitance, and inductance in series is given by

$$I = \frac{E}{\sqrt{R^2 + \left(2\pi fL - 1/(2\pi fC)\right)^2}}$$

Where I = current (amperes), E = voltage (volts), R = resistance (ohms), L = inductance (henrys), C = capacitance (farads), and f = frequency (hertz). Write a program that reads values for the voltage, resistance, capacitance, Inductance, and frequency and then calculates and displays the current.

13) Write a program in C++ to enter Principal, Time, Rate and calculate Compound Interest. Sample Output:

Input the Principle: 20000
Input the Rate of Interest: 10
Input the Time: 1.5
The Interest after compounded for the amount 20000 for 1.5 years @ 10 % is: 3073.8
The total amount after compounded for the amount 20000 for 1.5 years @ 10 % is: 23073.8

Note:

For the below questions explore ***iomanip*** header file specially setw, setprecision, setfill, fixed etc.

14) The monthly payment on a loan may be calculated by the following formula:

$$Payment = \frac{Rate * (1 + Rate)^N}{((1 + Rate)^N - 1)} * L$$

Rate is the monthly interest rate, which is the annual interest divided by 12. (12% annual interest rate would be 1% monthly interest.) N is the number of payments and L is the amount of loan. Write a program that asks for these values and displays a report similar to:

Loan Amount:	$ 10000.00
Monthly Interest Rate:	1%
Number of Payments:	36
Monthly Payments:	$ 332.14
Amount Paid Back:	$ 11957.15
Interest Paid:	$ 1957.15

15) Write a program that will convert U.S dollars to Japanese yen and to Euros, storing the conversion factors in constants YEN_PER_DOLLAR and EUROS_PER_DOLLAR.

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To get the most up-to-date exchange rates, search the internet using the term currency exchange rate. If you cannot find the most recent exchange rates, use the following:

1 Dollar = 144.06
1 Dollar = 0.8337

Format your currency amount in fixed point notation, with two decimal places of precision, and be sure the decimal point is always displayed.

16) Write a program that asks the user for an angle, entered in radians. The program should then display the sine, cosine, and tangent of the angle. (Use the sin, cos, and tan library functions to determine these values.) The output should be displayed in fixed-point notation rounded to four decimal places of precision.

17) You found an exciting summer job for five weeks. It pays, say, $15.50 per hour. Suppose that the total tax you pay on your summer job income is 14%. After paying the taxes, you spend 10% of your net income to buy new clothes and other accessories for the next school year and 1% to buy school supplies. After buying clothes and school supplies, you use 25% of the remaining money to buy savings bonds. For each dollar you spend to buy savings bonds, your parents spend $0.50 to buy additional savings bonds for you. Write a program that prompts the user to enter the pay rate for an hour and the number of hours you worked each week. The program then outputs the following:

- Your income before and after taxes from your summer job.
- The money you spend on clothes and other accessories.
- The money you spend on school supplies.
- The money you spend to buy savings bonds.
- The money your parents spend to buy additional savings bonds for you.

18) A room has one door, two windows, and a built-in bookshelf and it needs to be painted. Suppose that one gallon of paint can paint 120 square feet. Write a program that prompts the user to input the lengths and widths of the door, each window, the bookshelf; and the length, width, and height of the room (in feet). The program outputs the amount of paint needed to paint the walls of the room.

19) Modify Programming Exercise 18 so that the user can also specify the area that can be painted with one gallon of paint.

20) In an elementary school, a mixture of equal amounts of nuts and dried fruit is provided during lunch. Suppose that the number of calories in each pound of nuts is 0.70 times the number of calories in each pound of dried fruit. Write a program that prompts the user to input the number of students in the elementary school, the number of calories required for each student from the mixture, and the number of calories in each pound of nuts. The program outputs the amount of nuts and dried fruit needed for the students. (For simplicity, assume that each student requires the same amount of calories.)

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21) Two cars *A* and *B* leave an intersection at the same time. Car *A* travels west at an average speed of *x* miles per hour and car *B* travels south at an average speed of *y* miles per hour. Write a program that prompts the user to enter the average speed of both the cars and the elapsed time (in hours and minutes) and outputs the (shortest) distance between the cars.

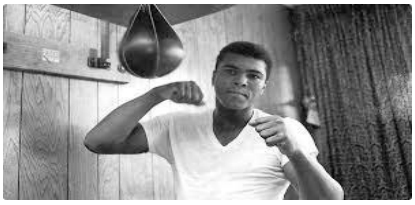
22) Write a program that can be used as a math tutor for a young student. The program should display two random numbers to be added, such as

```
   247
+  129
 ---------
```

The program should then pause while the student works on the problem. When the student is ready to check the answer, he or she can press a key and the program will display the correct solution:

```
   247
+ 129
--------
   376
```

Both the random numbers will be greater than zero and maximum 5 digits.



I hated every minute of training, but I said, 'don't quit.
Suffer now and live the rest of your life as a champion.'

[Muhammad Ali [17-Jan-1942 ~ 3-Jun-2016]]

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