NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES
ISLAMABAD CAMPUS Programming Fundamentals (CS -118)
FALL 2018

ASSIGNMENT #2
Total Marks: 100

Due Date: Monday 24th September, 2018 (11:30 pm)

Instructions

1. *Write the C++ programs.*
2. *Solution to all the problems should be written in a separate (.cpp) file.*
3. *Submit the source code (i.e. .cpp file) via slate. Submissions via email will not be accepted.*
4. *Use appropriate variables and proper naming conventions for variable names.*
5. *Display output in proper format.*
6. *Use proper naming convention to name the file containing source code.*
   For example, the file containing the source code for first question of the first assignment should be named as i18xxxx_assignment_1_q1.cpp, replace i18xxxx with your student number.

Plagiarism:
Plagiarism is not allowed. If found plagiarized, you will be awarded zero marks in the assignment.

Note:

- Don't upload compressed/zip file.
- Follow the given instruction to the letter, failing to do to so will result in a **zero.**

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Problem 1: Write a C++ program that reads three integers and prints the average of these.

Problem 2: Write a C++ program that reads sides of a triangle and finds its area.

Problem 3: Write a C++ program that simulates a simple calculator. It reads two integers as input and print their sum, difference, product, quotient and remainder.

Problem 4: Write a C++ program that takes radius as an input and calculates and prints circumference of a circle.

Problem 5: Write a C++ program which accepts a capital character as an input and then converts and display its corresponding small character.
Hint use ASCII values for conversion.

Problem 6: Write a C++ program to swap the values of two variables without using third variable.

Problem 7: Write a C++ program which accepts amount as integer and display total number of Notes of Rs. 500, 100, 50, 20, 10, 5 and 1.
For example, when user enter a number, 575,
the results would be like this...
500: 1
100: 0
50: 1
20: 1
10: 0
5: 1
1: 0

Problem 8: Write a C++ program that takes 4-digit number from user and prints sum of all digits:
Example program execution:

INPUT : 1234 SUM : 10
INPUT : 5982 SUM : 24

Use the quotient operator / and the remainder operator % to extract the digits from the integer.

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Problem 9: Write a C++ program that takes length as input in feet and inches. The program should then convert the lengths in centimeters and display it on screen. Assume that the given lengths in feet and inches are integers.

Problem 10: Write a C++ program that will ask the user to enter the amount of a purchase and compute the state and county sales tax. Assume the state sales tax is 5 percent and the county sales tax is 2.5 percent. Your program should print the amount of the purchase, the state sales tax, the county sales tax, the total sales tax, and the total of the sale.

Problem 11: Write a program that asks the user to enter the monthly costs for the following expenses incurred from operating his or her automobile: loan payment, insurance, gas, oil, tires, and maintenance. The program should then display the total monthly cost of these expenses, and the total annual cost of these expenses.

Problem 12: 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 from <cmath> library functions to determine these values.) The output should be displayed in fixed-point notation, rounded to four decimal places of precision.

Problem 13: Assuming there are no deposits other than the original investment, the balance in a savings account after one year may be calculated as:

$$Amount = Principal * \left(1 + \frac{Rate}{T}\right)^{T}$$

- Principal is the balance in the savings account,
- Rate is the interest rate, and
- T is the number of times the interest is compounded during a year (T is 4 if the interest is compounded quarterly).

Write a program that asks for the principal, the interest rate, and the number of times the interest is compounded. It should display a report similar to:

```
Interest Rate:              4.25%
Times Compounded:             12
Principal:              $ 1000.00
Interest:               $   43.34
Amount in Savings:      $ 1043.34
```

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

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

Rate is the monthly interest rate, which is the annual interest rate divided by 12. (12% annual interest would be 1 percent monthly interest.) N is the number of payments and L is the amount of the 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 Payment:        $   332.14
Amount Paid Back:       $ 11957.15
Interest Paid:          $  1957.15
```

Problem 15: Joe s Pizza Palace needs a program to calculate the number of slices a pizza of any size can be divided into. The program should perform the following steps:

1) Ask the user for the diameter of the pizza in inches.
2) Calculate the number of slices that may be taken from a pizza of that size.
3) Display a message telling the number of slices.

To calculate the number of slices that may be taken from the pizza, you must know the following facts:

- Each slice should have an area of 14.125 inches.
- To calculate the number of slices, simply divide the area of the pizza by 14.125.

- The area of the pizza is calculated with this formula:

$$A = \pi r^2$$

Make sure the output of the program displays the number of slices in fixed point notation, rounded to one decimal place of precision. Use a named constant for pi.

Problem 16: 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 a city
- The name of a college
- A profession
- A type of animal
- A pet s name

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

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