

ASSIGNMENT # 2

Programming Fundamentals (BSCS-1N)

Deadline: October 15, 2021

Marks: 100

Problem #1: [Marks: 10]

Write a program that determines whether a meeting room is in violation of fire law regulations regarding the maximum room capacity. The program will **read** in the **maximum room capacity** and the **number of people** to attend the meeting. If the number of people is less than or equal to the maximum room capacity, the program announces that it is legal to hold the meeting and tells how many additional people may legally attend. If the number of people exceeds the maximum room capacity, the program announces that the meeting can't be held as planned due to fire regulations and tells how many people must be excluded in order to meet the fire regulations.

Problem # 2: [Marks: 10]

Write a program that reads three numbers, assigns the appropriate Boolean values to the following Boolean variables and displays their values.

triangle: **true** if the real numbers can represent lengths of the side of a triangle
 (sum of any two sides > third side) ; **false** otherwise
equilateral: **true** if triangle is true and the triangle is equilateral; false otherwise
isosceles: **true** if triangle is true and the triangle is isosceles; false otherwise
scalene: true if triangle is true and the triangle is scalene (no two sides equal); false
 otherwise

Problem # 3: [Marks: 10]

Angles are often measured in degrees (°), minutes (') and seconds ("). There are 360 degrees in a circle, 60 minutes in a degree and 60 seconds in one minute.

Write a program that reads two angular measurements given in degrees, minutes and seconds and then calculates and displays their sum. e.g.,

$74^{\circ} 29' 13'' + 105^{\circ} 8' 16'' = 179^{\circ} 37' 29''$
 $7^{\circ} 14' 55'' + 5^{\circ} 24' 55'' = 12^{\circ} 39' 50''$
 $20^{\circ} 31' 19'' + 0^{\circ} 31' 30'' = 21^{\circ} 2' 49''$
 $122^{\circ} 17' 48'' + 237^{\circ} 42' 12'' = 0^{\circ} 0' 0''$

Problem # 4: [Marks: 10]

Write a program that reads the coordinates of three points and determines whether they are collinear.

Problem # 5: [Marks: 10]

Write a program that reads values of the coefficients A, B, C, D, and E of the equations of two straight lines:

$$Ax + By = C$$

$$Dx + Ey = F$$

and then determine whether the lines are parallel (their slopes are equal) or lines intersect. If they intersect, determine whether the lines are perpendicular (the product of their slopes is equal to -1).

Problem # 6: [Marks: 10]

Write a C++ program that gets the date, the month and the year from the user and displays the name of the day of the week on which that date fell or will fall.

Reverend Zeller developed a formula for computing the day of the week.

Let

a = The number of month of the year (March = 1, April = 2,, December = 10 of the current year while Jan=11 and Feb =12 of the preceding year).

b = The date

c = The year of the century

d = The century

e.g., July 31, 1929 (a = 5, b = 31, c = 29, d = 19)

January 03, 1988 (a=11, b = 3, c = 87, d =19)

Now calculate

w = integer quotient of $(13a-1) / 5$

x = integer quotient of $c/4$

y = integer quotient of $d/4$

and $z = w + x + y + b + c - 2d$

while $r = z \% 7$

If $r = 0$, it is Sunday; if $r = 1$, it is Monday, if $r = 2$, it is Tuesday and so on.

Problem # 7: [Marks: 10]

Write an 8-function calculator program that allows the user to perform addition, subtraction, multiplication, division, exponentiation, base-10 logarithm, factorial, and quit operations.

Here is the illustration of the program:

Welcome to the 8-function Calculator!

Enter

+	for addition operation
-	for subtraction operation
*	for multiplication operation
/	for division operation
^	for exponentiation operation
l	for base-10 logarithm operation
!	for factorial operation
q	to quit

--> /

Enter the first operand: 5

Enter the second operand: 8

The result is 0.625

--> ^

Enter the first operand: 3

Enter the second operand: 4

The result is 81

-- > !

Enter the operand: 5

The result is 120

-- > q

(Quit the menu)

Problem # 8: [Marks: 10]

Write a program that uses a loop to calculate and display the squares of consecutive positive integers until the difference between a square and the preceding one is greater than 50.

Problem # 9: [Marks: 10]

A liter is 0.264179 gallons and a mile has 1.6091 kilometers. Write a program that will read in the number of liter of gasoline consumed by the user's car and the number of kilometers traveled by the car, and will then output the number of miles per gallon the car delivered. Your program should allow the user to repeat this calculation as often as the user wishes.

Problem # 10: [Marks: 10]

Write a C++ program that uses a loop to calculate and display the sum and average of n positive integers entered by the user. The value of n is provided by the user.