FAST-NUCES

Fall Term 2022

Programming Fundamentals (H section)

Assignment 2

Total marks 100

Note: Do not copy code from internet or any other source even across the sections. I will check the plagiarism of the assignment and it will capture the cheated code from internet or copied from class fellows. Those who will try they will get some marks for their effort even you do not get perfect solution. Copied & Shared work will score in negative grading. Assignment should be in jupyter. After submission, no excuse will be entertained. No assignment will be accepted after due date.

Write c++ code of the following:

Q1) Compute Quotient and Remainder by asking Dividend as "div" and Divisor as "dis" from the user. Use q and r for quotient and remainder variables. Also, display the Quotient and remainder. 3

Q2) Write a program that plays a word game with the user. The program should ask the user to enter the following: 7

- 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 live 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!

Q3) Last month Joe purchased some stock in Acme Software, Inc. Here are the details of the purchase: 7

- The number of shares that Joe purchased was 1,000.
- When Joe purchased the stock, he paid $45.50 per share.
- Joe paid his stockbroker a commission that amounted to 2% of the amount he paid for the stock.
- Two weeks later Joe sold the stock. Here are the details of the sale:
- The number of shares that Joe sold was 1,000.
- He sold the stock for $56.90 per share.
- He paid his stockbroker another commission that amounted to 2% of the amount he received for the stock.

FAST-NUCES

Q4) Write a program that prints *Bjarne* (creator of C++) on the console in the following manner: 5

```
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     JJJ      A   A     R   R     N   NN     EEEEE
```

Q5) 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. Use #include<cmath> and use sqrt() to calculate square root. *marks:3*

Q6) Write a c++ program to check whether a number entered by user is negative, positive or equal to zero. Hint: Use else if. *marks:2*

Q7) Write c++ program to check person is oldest and youngest among the 3. Use Nested if.

Q8) Write Question 4 now with only if. *marks:3*

Q9) Write a program to check whether a triangle is valid or not. Valid triangles contain summation of all angles==180. Get the three angles from the user.

Trick: *you will calculate sum of three angles==180 and print valid triangle if sum is 180. Angle1, angle2 and angle3 should not be zero.* *marks:3*

FAST-NUCES

Q10) One way to determine how healthy a person is by measuring the body fat of the person. The formulas to determine the body fat for female and male are as follows: *marks:10*

Body fat formula for women:

A1 = (body weight × 0.732) + 8.987

A2 = wrist measurement (at fullest point) / 3.140

A3 = waist measurement (at navel) × 0.157

A4 = hip measurement (at fullest point) × 0.249

A5 = forearm measurement (at fullest point) × 0.434

B = A1 + A2 − A3 − A4 + A5

Body fat = body weight − B

Body fat percentage = body fat × 100 / body weight

Body fat formula for men:

A1 = (body weight × 1.082) + 94.42

A2 = wrist measurement × 4.15

B = A1 − A2

Body fat = body weight − B

Body fat percentage = body fat × 100 / body weight

Write a program to calculate the body fat of a person.

Q11) The cost of renting a room at a hotel is, say $100.00 per night. For special occasions, such as a wedding or conference, the hotel offers a special discount as follows: If the number of rooms booked is at least 10, the discount is 10%; at least 20, the discount is 20%; and at least 30, the discount is 30%. Also if rooms are booked for at least three days, then there is an additional 5% discount. Write a program that prompts the user to enter the cost of renting one room, the number of rooms booked, the number of days the rooms are booked, and the sales tax (as a percent). The program outputs the cost of renting one room, the discount on each room as a percent, the number of rooms booked, the number of days the rooms are booked, the total cost of the rooms, the sales tax, and the total billing amount. Your program must use appropriate named constants to store special values such as various discounts. 7

Q12) **Collinear points** are the points that lie on the same line. If two or more than two points lie on a line close to or far from each other, then they are said to be collinear. Marks 20

Formula for Collinear points

There are two methods to find the collinear points. They are:

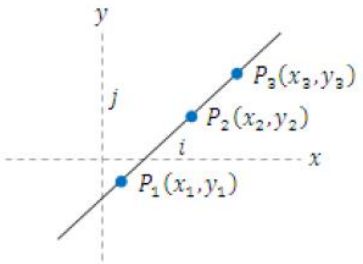
- Slope Formula
- Area of triangle

Using Slope Formula: Three or more points are said to be collinear if the slope of pairs of points is the same. Suppose, X, Y and Z are the three points, with which we can form three sets of pairs, such that, XY, YZ and XZ are three pairs of points. Then, as per the slope formula,

If Slope of XY = Slope of YZ = Slope of XZ, then the points X, Y and Z are collinear.

Note: Slope of the line segment joining two points say $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ is given by the formula:

$m = (y_2 – y_1) / (x_2 – x_1)$



Using the Area of Triangle Formula: If the *area of triangle* formed by three points is zero, then they are said to be collinear. It means that if three points are collinear, then they cannot form a triangle. Suppose, the three points P(x_1, y_1), Q(x_2, y_2) and R(x_3, y_3) are collinear, then by remembering the formula of area of triangle formed by three points we get;

$(1/2)\ [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] = 0$

Task 1: Write a C++ program to compute whether the given points are collinear or not by using slope method.

Task 2: Write a C++ program to compute whether the given points are collinear or not by using area of triangle method.

Q13) Sound level *L* in units of decibel (dB) is determined by marks 20

$$L = 20 \log_{10}(p/p0)$$

where *p* is the sound pressure of the sound (in Pascals, abbreviated Pa), and *p*0 is a reference sound pressure equal to 20 × 10–6 Pa (where *L* is 0 dB).

The following table gives descriptions for certain sound levels.

Threshold of pain	130 dB
Possible hearing damage	120 dB
Jack hammer at 1 m	100 dB
Traffic on a busy roadway at 10 m	90 dB
Normal conversation	60 dB
Calm library	30 dB
Light leaf rustling	0 dB

Write a program that reads a value and a unit, either dB or Pa, and then prints the closest description from the list above.

Q14) ***Giving change***. Implement a program that directs a cashier how to give change. The program has two inputs: the amount due and the amount received from the customer. Display the dollars, quarters, dimes, nickels, and pennies that the customer should receive in return. In order to avoid round off errors, the program user should supply both amounts in pennies, for example 274 instead of 2.74. marks 10

GOOD LUCK