

LAB 3: The Basic of C – Part 2

For each problem below:

- a) Analyze the problem by identifying input, output, formula, and condition
- b) Design an algorithm to solve the problem using pseudocode (so that you could include the pseudocode in your program)
- c) Prepare several, appropriate number of test data to verify the correctness of your program
- d) Prepare, compile, link, and execute the program to solve the problem
- e) Test your program using the prepared test data
- f) Write proper documentation in the program. Include the following information to form a banner at the beginning of your program:

```

/*****
* Author: your name and student ID
* Course: the course code only
* Section: your specific section number
* Date: of lab session
* Brief description: of what problem the
*                  program tries to solve
* Pseudocode: write the algorithm to solve the
*              problem
* Test data: provide a set of test data
*            - input & expected output
*****/

```

QUESTIONS

1. Write a program that reads two numbers from user and display the addition, subtract, multiplication, division, and remainder operations table of the two numbers. The output should be formatted in the following manner:

```

Enter two numbers: x y

C Operation      Arithmetic Operator  C Expression
-----
Addition         +                  x + y = a
Subtraction      -                  x - y = b
Multiplication   *                  x * y = c
Division         /                  x / y = d
Remainder        %                  x % y = e
-----

```

(Hint: do remember that `int / int` results in an `int` value. Implement type casting in this program)

2. Write a program that creates a table of Kelvin, Fahrenheit, and Celsius degrees. Display the output in the following manner:

Table of Kelvin, Fahrenheit, and Celsius degrees			
	Kelvin	Fahrenheit	Celcius
Absolute Zero	0.00	x.xx	x.xx
Boiling point of liquid nitrogen	77.40	x.x	x.x
Sublimation point of dry ice	195.10	x	x.x
Intersection of Celsius and Fahrenheit scales	233.15	x	x
Normal human body temperature	310.00	x.xx	x.xx
Water's boiling point at 1 atm	373.1339	x.xxxx	x.xxx

(Hint: Use proper conversion formulas since multiple operators in an arithmetic expression are evaluated based on three rules – parentheses rules, precedence rules and associativity rules.)

3. Write a program that creates a table of Olympic competition running distances in meters, kilometers, yards, and miles given distances in meters. The following distances should be used: 100m, 200m, 400m, and 800m. Print the result on the screen in the following manner:

Table of Olympic running distances			
Meters	Kilometers	Yards	Miles
100	x.xxx	x.xxx	x.xx
200	x.xxx	x.xxx	x.xx
400	x.xxx	x.xxx	x.xx
800	x.xxx	x.xxx	x.xx

(Hint: 1 m = 0.001 km = 1.094 yd = 0.0006215 miles)

4. Write a program that is capable of displaying the distances from the sun to the four planets closest to the sun in centimeters and inches given the kilometer distances as follows: Mercury – 58km, Venus – 108.2km, Earth – 149.5km, and Mars – 227.8km. Print the result on the screen in the following manner:

Planet	Distance from the sun		
	(million km)	(cm)	(inches)
Mercury	58	x	y
Venus	108.2	x	y
Earth	149.5	x	y
Mars	227.8	x	y