Problem set - Alpha

Topics - Input, Output, Operators and Branching

Task-1

Write the Java code for the following:

A. Declare an **integer** variable. Initialize it with some value of your choice and print it to check the value has been stored properly.
B. Declare and initialize another **integer** variable. Add this to the first one (without creating a new variable) and print out the result. Verify that the addition has been done correctly.
C. Now print the product and division of the two **integer** numbers.
D. Repeat exercises 1A, 1B, and 1C for variables of data type **double**. Verify your answers.
E. Repeat exercises 1A, 1B, and 1C for one **double** data type and one **integer** datatype. Verify your answers.
F. Repeat exercises 1A and 1B for variables of data type **String**. How does the addition operator work for Strings? What if the first variable is an integer and the second is a String and vice versa?

Repeat 1A and 1B for integers taken as inputs from the user.

Task-2

Write a Java program declaring two integer variables and initializing them. Your task is to swap the values of these two variables. You must complete it using two different approaches.

a) By Creating a third variable.
b) Without creating any other variables.

Task-3

Suppose your student id is 1234567. Write a Java program that displays the 2 rightmost digits of an student ID in reverse order.

** *You need to print 7 and then 6.*

Sample input	**Sample output**
1234567	7 6

Task-4

Write a Java code to display the multiplication table for a positive integer 'n'. The table should include the products of 'n' with each of the numbers from 1 to 10. For example, if n = 5, your code should output:

5 x 1 = 5

5 x 2 = 10
5 x 3 = 15
...
5 x 10 = 50
[Try not using loops to solve this problem.]

Task-5

Write the Java code of a program to find the largest among three different numbers entered by the user.

Sample Input	Output
105 47 -7	Largest number: 105
5 17 -5	Largest number: 17

Task 6

Write a Java code that will take a year as input and print whether that year is a leap year or not.

a) A year may be a leap year if it is evenly divisible by 4.
b) Years that are divisible by 100 (century years such as 1900 or 2100) cannot be leap years unless they are also divisible by 400 (1600 or 2000).

Sample Input	Output
2020	2020 is a leap year
2001	2001 is not a leap year
1900	1900 is not a leap year
2000	2000 is a leap year

Task 7

Write a Java code of a program that takes an integer number as user input and then determines if that number is divisible by both 5 and 7; otherwise display “No”. For example, numbers like 35, 70, 105, 140, 175, 210, 245, 280 etc. can be divisible by both 5 and 7.

Sample Input	Output

15	Invalid: Divisible by 5 Only
28	Invalid: Divisible by 7 Only
105	Divisible by Both
36	No

Task 8

Write a Java Program, that takes in a 'X' university student ID as integer and prints out the year and the session the student enrolled in.

Hints:

a) The first two digits denote the year the student got enrolled
b) The 3rd digit denotes the session Student joined
c) (Spring→1, Summer→3, Fall→2)

Sample Input	Output
16101307	Student Joined 'X UNI' in Spring 16
19301307	Student Joined 'X UNI' in Summer 19
20201307	Student Joined'X UNI' in Fall 20

Task 9

Write a Java program that takes the CGPA and no of credits completed by a student and prints whether the student is eligible for a waiver and of what percentage.

To be eligible for a waiver, a student must have completed at least 30 credits and earned a CGPA greater or equal to 3.8. If not, please print "The student is not eligible for a waiver".

CGPA	Waiver percentage
3.80 - 3.89	25 percent
3.90 - 3.94	50 percent
3.95 - 3.99	75 percent

CGPA	Waiver percentage
3.80 - 3.89	25 percent
4.00	100 percent

Now let's look at the samples.

Sample Input	Sample Output
3.93 78	The student is eligible for a waiver of 50 percent
3.79 24	The student is not eligible for a waiver

Task 10

Write the Java code of a program that takes an integer from the user, and prints the integer it is a multiple of **either 2 or 5 but not both.** If the number is a multiple of 2 and 5 both, then print "Multiple of 2 and 5 both". For all other numbers, the program prints "Not a multiple we want".

For example, 2, 4, 5, 6, 8, 12, 14, 15, 16, 18, 22 … i.e. this includes multiples of 2 only and multiples of 5 only, NOT multiples of 2 and 5 both or other numbers.

hint(1): we may use the modulus (%) operator for checking the divisibility

hint(2): we can consider the number to be an integer

Sample Input	Output
6	6
15	15
10	Multiple of 2 and 5 both
17	Not a multiple we want

Task 11

Let's consider the following piece wise function:

$$f(x) = \begin{cases} 2x, & x < 0 \\ x + 1, & 0 \leq x < 2 \\ x^2 - 1, & 2 \leq x < 5 \\ 3x^2 + 2, & x \geq 5 \end{cases}$$

Write a Java code of a program that takes the value of x as user input and then displays the output based on the given piece wise function.

Sample Input	Output
-3	-6
1	2
4	15
10	302