Assignment#3: Selection and Repetition Review Exercise (Mock-up Quiz - 28 Aug 2024)

Question#1: Counting from 1 to N

Write a program that reads an integer input from the user and then prints the numbers from 1 to n (inclusive) on the same line, with each number separated by a space.

For Example:

Input	Result
3	1 2 3

Test Cases:

Input	Result
37	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
7	1 2 3 4 5 6 7
50	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
100	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Question#2: Decimal to Binary

Your Sophomore CS students are currently studying number systems in the CSC203 Computer Architecture and Organizations course. They require a program to convert decimal number and displays its corresponding binary (base 2) representation value.

Note: Don't use Java's `Integer.toBinaryString(int)` in this program.

For Example:

Input	Result
147	10010011

Test Cases:

Input	Result
2	10
4	100
2147483647	11111111111111111111111111111111
7	111
1024	10000000000
15	1111
127	1111111
64	1000000
3	11

Question#3: Even and Odd Number Classification

Write a program that reads an integer n from the user. The program should then print two separate lines:

1. The first line should display all the even numbers from 1 to n (inclusive) in ascending order, separated by spaces.
2. The second line should display all the odd numbers from 1 to n (inclusive) in ascending order, separated by spaces.

For Example:

Input	Result
10	Even numbers: 2 4 6 8 10 Odd numbers: 1 3 5 7 9

Test Cases:

Input	Result
37	Even numbers: 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 Odd numbers: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37
15	Even numbers: 2 4 6 8 10 12 14 Odd numbers: 1 3 5 7 9 11 13 15
4	Even numbers: 2 4 Odd numbers: 1 3
99	Even numbers: 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 Odd numbers: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99

Question#4: Fibonacci with Loop

Write a program that reads an integer n from the user. The program should then print all Fibonacci numbers that are less than or equal to n, each separated by a space.

For Example:

Input	Result
5	0 1 1 2 3 5

Test Cases:

Input	Result
20	0 1 1 2 3 5 8 13
1	0 1 1
50	0 1 1 2 3 5 8 13 21 34
100	0 1 1 2 3 5 8 13 21 34 55 89
0	0

Question#5: Mean and Standard Deviation

In a business application, Ms. Kerr asked you to compute the mean and standard deviation (SD) of a data set. The mean is simply the average of the numbers, while the standard deviation is a statistic that tells you how tightly the data points are clustered around the mean. For example, consider the average age of students in a class: how close are the ages to each other? If all the students are the same age, the standard deviation is 0.

Write a program that reads ten numbers and displays the mean and standard deviation of these numbers using the following formula:

$$mean = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n}, standard\ deviation = \sqrt{\frac{\sum_{i=1}^{n} x^2{}_i - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}}{n-1}}$$

Note: You MUST use selection and repetition without using arrays.

For Example:

Input	Result
1 2 3 4.5 5.6 6 7 8 9 10	Mean: 5.61 SD: 2.99794

Test Cases:

Input	Result
10 10 10 10 10 10 10 10 10 10	Mean: 10.0 SD: 0.00000
1 2 3 4 5 6 7 8 9 10	Mean: 5.5 SD: 3.02765
2 4 4 4 5 5 7 9 10 10	Mean: 6.0 SD: 2.82843
5 15 25 35 45 55 65 75 85 95	Mean: 50.0 SD: 30.27650
-5 -10 -15 -20 -25 -30 -35 -40 -45 -50	Mean: -27.5 SD: 15.13825

0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10	Mean: 0.05500000000000001 SD: 0.03028
50 51 52 53 54 55 56 57 58 59	Mean: 54.5 SD: 3.02765
1000 -1000 500 -500 250 -250 125 -125 60 -60	Mean: 0.0 SD: 544.00266
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0	Mean: 1.55 SD: 0.30277

Question#6: Cola Game

Mr. A and Arslan Mrs. B like to drink Cola. They usually challenge each other to drinking a lot of Cola. In each round of challenge, the first person to drink will be random as well as a total number of Cola is also random. The order of drinking is shown in the below table.

Round	1	2	3	4	5	...	n
First Person	1	3 4	7 8 9	13 14 15 16	21 22 23 24 25	...	...
Second Person	2	5 6	10 11 12	17 18 19 **20**	26 27 28 29 30	...	...

Your task is to write a program to check which person will drink the last glass of Cola in order to ensure that both of them drink Cola according to the condition of the challenge. For example, if the first person to drink Cola is A and total number of Cola to drink is 20, the B is the one who drink the last glass of Cola (i.e., the 20th of Cola glass).

The input consists of two data:

1. A person who will drink the first glass of Cola
2. Total number of Cola

For Example:

Input	Result
A 20	B

Test Cases:

Input	Result
B 21	B
A 30	B
B 36	B
B 6	A
A 54	B
A 43	A
A 46	A

Question#7: Century

Write a program to output the century from the given year. The input is the year, and the output is century with its suffix.

For Example:

Input	Result
1500	15th

Test Cases:

Input	Result
1535	16th
2021	21st
2245	23rd
2200	22nd
1400	14th
1985	20th
3021	31st
3215	33rd
2105	22nd
1201	13th

Question#8: Valid Ip Address

Write the program to check whether the given IP address (IPV4) is valid or not.

The given input is the IP address consisting of 4 parts separated by dot (.). Every part of IP address mush have the value ranged from 0 to 255 [0-255].

The output is the text indicating "Valid" or "Invalid".

Hint: To convert String to Integer, you can use the static method of Integer class as follow:

```
Integer.parseInt(String s)
```

This method will convert the input (String s) to an integer and return the converted integer.

For Example:

Input	Result
256.123.254.1	Invalid
192.168.1.1	Valid

Test Cases:

Input	Result
172.0.0.1	Valid
24.228.-12.207	Invalid
246.148.101.100	Valid
1.323.243.56	Invalid
23.35.646.1	Invalid
45.66.77.777	Invalid