Octave Work Sheet

StatsLabDublin (www.stats-lab.com)

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Part A : Working with Octave

Question A.1

1. Clear the screen, and change the prompt to the following:

```
>>:
>>:
```

2. Change the **Working Directory** to `C:/WorkArea/Octave`.

3. Close the current octave session.

Part B : Basic Mathematical Operations

There will be a separate section for Matrices and Linear Algebra.

Question B.1

1. Compute the sum of the first 100 positive integers.

$$\sum_{i=1}^{100} i$$

2. Compute the sum of the squares of the **first** 100 positive integers.

$$\sum_{i=1}^{100} i^2$$

Question B.2

1. Determine the prime factors of the following numbers

   - **8475495**
   - **934234**
   - **783932234**

Question B.3

1. Evaluate the following expression:

$$e^{i\pi}$$

2. Evaluate the following expression:

$$\lceil e^{1.5} \rceil$$

3. Evaluate the following expression:

$$\lfloor tan\left(\frac{\pi}{3}\right) \rfloor$$

Question B.4

1. How many prime numbers are less than 100?

2. Compute the sum of all prime numbers less than 100.

3. Compute the sum of all prime numbers between 50 and 100.

4. Compute the sum of the first 100 prime numbers.

Question B.5

Let **P** be the set of all prime numbers less than 10000.

1. How many numbers are there in set **P**?

2. For each value of **P**, determine the set **P1**, which are the floor function values of the square roots of each value of **P**. Compute the sum of the values in **P1**.

3. How many *unique* values are there in **P1**?

Question B.6

Suppose the data set X is a randomly selected sample.

```
X=[ 5.1, 4.9, 4.7, 4.6, 5, 5.4, 4.6, 5, 4.4, 4.9, 5.4,4.8]
```

1. How many values are there in X?

2. Compute the sum of the values in X.

3. Calculate the mean, median and mode of X.

4. Calculate the standard deviation and variance of X.

5. Calculate the maximum value, minimum value and range of X.

Question B.7

Determine the roots of the following polynomials. (Some will have complex roots)

$$x^3 + 2x^2 - 5x + 4$$

$$x^4 - 4x^4 + 6x^2 - 4x + 1$$

$$x^5 + 4x^3 + 2x + 1$$

Part C: Matrices and Linear Algebra

Construct the following Matrices

$$A = \begin{pmatrix} 4 & 7 & 5 \\ 1 & 2 & 5 \\ 6 & 1 & 3 \end{pmatrix} \qquad B = \begin{pmatrix} 3 & 5 \\ 1 & 5 \\ 5 & 2 \end{pmatrix}$$

```
A = [4, 7, 5
1,2,5
6,1,3]
```

Question C.1

1. The inverse of matrix A (A^{-1}),

2. The rank of matrix A,

3. The product of A and B $(A \times B)$.

Question C.2

$$C = \begin{pmatrix} 2 & 7 & -5 & 5 \\ 4 & -2 & 7 & -1 \\ 6 & -3 & 0 & 3 \\ 4 & -2 & 7 & 1 \end{pmatrix}$$

```
C = [2, 7, -5, 5
4,-2,7,-1
6,-3,0,3
4,-2,7,1]
```

1. Replace all negative values of matrix C with 0. Call this matrix $C1$

2. Replace all negative values of matrix C with the absolute value of those values. Call this matrix $C2$.

Question C.3

Suppose we have the 3×4 matrix A.

$$A = \begin{pmatrix} 5 & 2 & 1 & -1 \\ 1 & 3 & 2 & 5 \\ -1 & 4 & 7 & 1 \end{pmatrix}$$

1. Compute the sum totals for each column,

2. Compute the sum totals for each row,

3. Compute the overall sum total.