Experiment- 1: Introduction to SCILAB (Part I)

1 Scilab as a Calculator

1. Define the variables $a = 15.62, b = -7.08, c = 62.5$ and $d = 0.5(ab - c)$.
   Evaluate:

   (a)
   $$a + \frac{ab(a+d)^2}{c\sqrt{|ab|}}$$

   (b)
   $$de^{(\frac{d}{2})} + \frac{\frac{ad+cd}{\frac{20}{a}+\frac{30}{b}}}{a+b+c+d}$$

2. Calculate:

   (a)
   $$cos^2(\frac{5\pi}{6})sin(\frac{7\pi}{8})^2 + \frac{tan(\frac{\pi}{6}ln8)}{\sqrt{7}}$$

   (b)
   $$\frac{3^7 log(76)}{7^3 + 546} + \sqrt[3]{910}$$

3. Calculate (by writing one command) the radius r of a sphere that has a volume of 350 m^3. Once r is determined, use it to calculate the surface area of the sphere.

2 Creating & Handling Arrays

1. Create a row vector A that has the elements: 32, 4, 81, $e^{2.5}$, 63, $cos(\frac{\pi}{3})$, and 14.12.
2. Calculate the sum S of all the elements in A .
3. Create a row vector in which the first element is 1, the last element is 33, with an increment of 2 between the elements.
4. Create a row vector with 15 equally spaced elements in which the first element is 7 and the last element is 40.
5. Create a column vector with 12 equally spaced elements in which the first element is -1 and the last element is -15.
6. Using the **zeros**, **ones** and **eye** command create the following arrays:

   (a)
   $$A = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

   (b)
   $$B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

   (c)
   $$C = \begin{bmatrix} 1 & 1 \\ 1 & 1 \\ 1 & 1 \end{bmatrix}$$

7. Create the following matrix A:
   $$A = \begin{bmatrix} 6 & 43 & 2 & 11 & 87 \\ 12 & 6 & 34 & 0 & 5 \\ 34 & 18 & 7 & 41 & 9 \end{bmatrix}$$

   Use the matrix A to:

   (a) Create a five-element row vector named **va** that contains the elements of the second row of A.

(b) Create a three-element row vector named **vb** that contains the elements of the fourth column of A.

(c) Create a ten-element row vector named **vc** that contains the elements of the first and second rows of A.

(d) Create a six-element row vector named **vd** that contains the elements of the second and fifth columns of A.

8. Create the following matrix A:

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 2 & 4 & 6 & 8 & 10 & 12 & 14 \\ 21 & 18 & 15 & 12 & 9 & 6 & 3 \\ 5 & 10 & 15 & 20 & 25 & 30 & 35 \end{bmatrix}$$

Use the matrix A to:

(a) Create a 3 x 4 matrix B from the 1^{st}, 3^{rd} and 4^{rth} rows and the 1^{st}, 3^{rd}, 5^{th} and 7^{th} columns of the matrix A.

(b) Create a 15 elements-long row vector **u** from the elements of the third row, the 5^{th} and 7^{th} columns of matrix A.

(c) Store the diagonal elements of matrix A in an array **D** and compute the sum of the diagonal elements of A.

(d) Display the size of matrix A in variable **S**.

(e) Reshape the matrix A into a 2 x 14 matrix A1 and a 14 x 2 matrix A2. Hence, compute the product P=A1*A2.

9. Using the **ones** and **zeros** commands, create a 4 x 5 matrix **V** in which the first two rows are 0's and the next two rows are 1's.

10. Create a 6 x 6 matrix **U** in which the middle two rows, and the middle two columns are 1's, and the rest are 0's.