MTP290 Tutorial Sheet - 1

1. Given the array $A = [3\ 4\ 5; 6\ 7\ 2; 3\ 5\ 9]$, provide the commands needed to
   - assign the first row of A to a vector called x.
   - assign the last two rows of A to a vector called y.
   - compute the sum over the columns of A.
   - compute the sum over the rows of A.
   - compute rank, inverse, size, diagonal elements, eigenvalue, eigenvector, and trace of A.
2. Write a program that adds the numbers 1 through 100, and save it as a '.m' file. (Do not use the formula $1 + 2 + \cdots + n = \frac{n(n+1)}{2}$)
3. Write a program that adds the even numbers between 1 and 100, and save it as a '.m' file.
4. Write a program that display the following $n \times n$ matrix for a given natural number n:

$$\begin{bmatrix} 0 & 0 & \dots & 0 & -1 \\ 0 & 0 & \dots & -1 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & -1 & \dots & 0 & 0 \\ -1 & 0 & \dots & 0 & 0 \end{bmatrix}_{n \times n}$$

5. Write down a MATLAB script ('.m' file) for finding the maximum of three given numbers a, b, and c. Test the code by taking $a = 1$, $b = 1$ and $c = 2$.
6. Write the MATLAB script to find the first integer n for which factorial(n) is a 100-digit number.
7. Write down the MATLAB function('.m' file) to produce the first 20 Fibonacci numbers.
8. Plot the graph of the following functions:
   (a) $y = \cos(x - 0.5)$ in $[0, 2\pi]$ (b) $y = e^{-x} \log x$ in $[0, 1]$.
9. Use the bisection method to find the solutions accurate to within $1e - 4$ for $x^3 - 7x^2 + 14x - 6 = 0$ on $[0, 1]$.
10. Use the bisection method to find the root of $x = \exp(-x)$ with an accuracy of 10^{-4}. How many iteration did you need?
11. Write down the MATLAB script for computing a root of a given function $f(x) = 0$ using Newton Raphson's method.
12. Write down the MATLAB script for computing a root of a given function $f(x) = 0$ using secant method.