Lab 7: M-script file-extended

1. a) Write three MATLAB functions to calculate the hyperbolic sine, cosine, and tangent functions: Use your functions to plot the shapes of the hyperbolic sine, cosine, and tangent functions.

$$\sinh(x) = \frac{e^x - e^{-x}}{2} \qquad \cosh(x) = \frac{e^x + e^{-x}}{2} \qquad \tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

2.

The gravitational force F between two bodies of masses m_1 and m_2 is given by the equation

$$F = \frac{Gm_1m_2}{r^2}$$

where G is the gravitation constant (6.672×10^{-11} N m^2/ kg^2), m_1 and m_2 are the masses of the bodies in kilograms, and r is the distance between the two bodies. Write a function to calculate the gravitational force between two bodies given their masses and the distance between them. Test you function by determining the force on an 800 kg satellite in orbit 38,000 km above the Earth. (The mass of the Earth is 5.98×10^{24} kg.)

3. a) Write a program that will solve for the roots of a quadratic equation and display the answer on the screen. The inputs required by this program are the coefficients a,b and c (to be taken from the user) of the quadratic equation ($ax^2+bx+c = 0$)

   b) Test the program for :

   - $x^2+5x+6 = 0$
   - $x^2+2x+5 = 0$