1. The potential energy of an object due to its height above the surface of the Earth is given by equation

\[ PE = mgh \]

where \( m \) is the mass of the object, \( g \) is the acceleration due to gravity and \( h \) is the height above the surface of the Earth. The kinetic energy of a moving object is given by the equation

\[ KE = \frac{1}{2}mv^2 \]

where \( v \) is the velocity of the object.

a) Write Matlab statements to calculate the total energy (potential and kinetic) possessed by an object in the earth’s gravitational field. (\( m=10 \) kg, \( g=9.8 \) m/s\(^2\), \( h=10 \) m and \( v=5 \) m/s.)

b) Rewrite your code in which prompt user to enter the height and the velocity of the mass. Then calculate potential and kinetic energies.

2. The period of an oscillating pendulum \( T \) (in seconds) is given by the equation:

\[ T = 2\pi \sqrt{\frac{L}{g}} \]

where \( L \) is the length of the pendulum in meters and \( g \) is the acceleration due to gravity.

a) Write MATLAB statements to calculate the period of a pendulum of the length \( L=10 \) cm (\( g=9.8 \) m/s\(^2\)).

b) Prompt user to enter the length of pendulum and then calculate period.

3. The volume \( V \) and surface area \( A \) of a sphere of radius \( r \) are given by

\[ V = \frac{4}{3}\pi r^3, \quad A = 2\pi r^2 \]

a) Write a MATLAB program to compute \( V \) and \( A \) for input value of radius, \( r \). (Your program will tell user to enter the radius as well.)

4. Write a MATLAB code to convert temperature from Fahrenheit scale to Kelvin scale where the conversion formula is given

\[ temp_K = \frac{5}{9}(temp_F - 32) + 273.15 \]