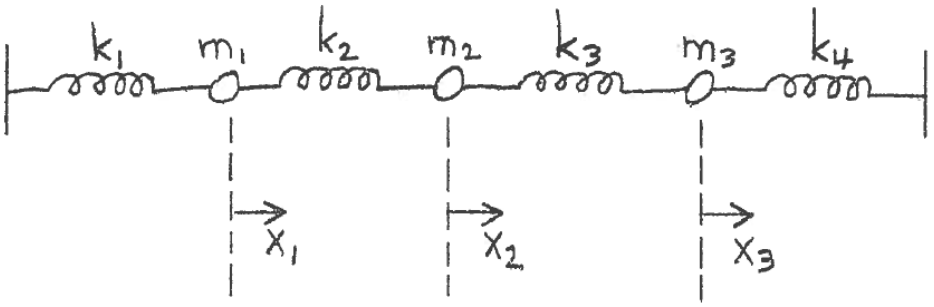
Sample 6b



In the mass-spring system shown above, the masses m_1, m_2 and m_3 are .8, .6 and .5, the spring constants k_1, k_2, k_3 and k_4 are 4.3, 5.1, 4.6 and 5.4, and x_1, x_2 and x_3 are the displacements of m_1, m_2 and m_3 from their equilibrium positions.

Write a MATLAB program as follows:

1) **t will go from 0 to 8 sec in steps of .001 sec.**
2) **Calculate the displacements and velocities of the masses for each value of t. Use 1e-7 as the accuracy factors, .7, .2 and .4 as the initial values of x_1, x_2 and x_3 , and 0 as the initial values of the velocities.**
3) **Plot x_1, x_2 and x_3 versus t using the colors blue, red and green and the t axis in black.**
4) **In a separate figure, plot the velocities v_1, v_2 and v_3 versus t using the colors blue, red and green and the t axis in black.**

The graphs should look like the ones on the attached sheets.

Equations

$$m_1 \frac{d^2x_1}{dt^2} = -k_1 x_1 + k_2(x_2 - x_1)$$

$$m_2 \frac{d^2x_2}{dt^2} = -k_2(x_2 - x_1) + k_3(x_3 - x_2)$$

$$m_3 \frac{d^2x_3}{dt^2} = -k_3(x_3 - x_2) - k_4 x_3$$