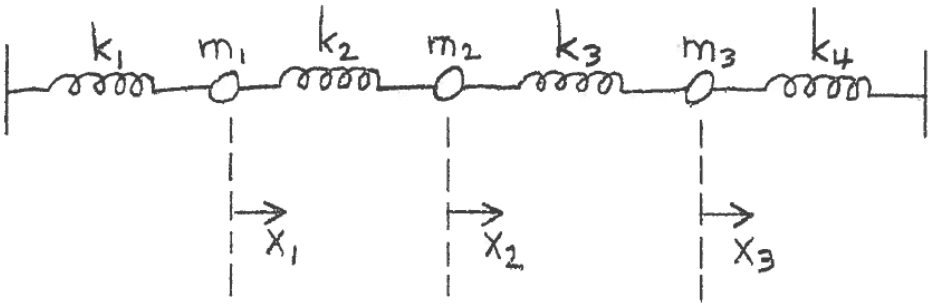
**Sample 7**




**In the damped 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, the damping constants $c_1$, $c_2$, $c_3$ and $c_4$ are .24, .12, .20 and .16, 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 12 sec in steps of .001 sec.**

2) **For each of the 3 natural frequencies, plot $x_1$, $x_2$ and $x_3$ versus t using using the colors blue, red and green and the t axis in black (there will be 3 figures). The figures should look like the ones on the attached sheets.**

**Equations**

$$m_1\frac{d^2x_1}{dt^2} = -k_1x_1 + k_2(x_2-x_1) - c_1v_1 + c_2(v_2-v_1)$$

$$m_2\frac{d^2x_2}{dt^2} = -k_2(x_2-x_1) + k_3(x_3-x_2) - c_2(v_2-v_1) + c_3(v_3-v_2)$$

$$m_3\frac{d^2x_3}{dt^2} = -k_3(x_3-x_2) - k_4x_3 - c_3(v_3-v_2) - c_4v_3$$