Write MATLAB code to simulate the response of the active suspension system discussed in Example 2.2 in Belanger for a variety of inputs $u$ and $y_R$. Keep the following points in mind while writing this code:

- Do not use "for" loops in MATLAB. Try as much as possible to use the built in MATLAB functions.

  For example, to generate a vector who's entries are samples of a sin function with frequency omega, you can use

  T = 0:0.01:10; f = sin(omega*T)

  rather than a "for" loop.

- Write the code to use general values of the coefficients $M$, $m$, etc. For this assignment, use the values given in example 2.2 in Belanger.

- MATLAB uses the data type "sys" to specify linear time invariant (lti) systems. The command "ss" will make up a system from the "A,B,C,D" matrices of the state space realization.

Save the code you use for this problem so that it can be used for future assignments. In your simulations, start from initial conditions such that $x_1 - x_2 - x_{1o} = 0$ and $x_2 - x_{2o} = 0$.

1. Simulate the response when the road surface is a step function that starts at $t = 2$, i.e.

$$y_R(t) \;=\; \begin{cases} 0 & 0 \le t \le 2 \\ 0.25 & 2 < t \end{cases}$$

2. Simulate the response when the road surface is a sum of two sinusoids

$$y_R(t) \;=\; 0.5\sin(9t) + 0.15\sin(t).$$

For each of the two cases above, plot $x_1$, $x_2$ and $y_R$ on the same plot. Chose the time axis long enough so that the basic dynamical behavior is clear.