Assigned on 05.10.2009 Monday
Due date 12.10.2009 Monday, beginning of the lecture

ME429 Fall 2009 HW1

You are expected to provide
- clear explanation of each step in your solution,
- units,
- well annotated scaled plots (title, axis labels, units, ..), not random hand sketches,
- source code attached to your solution if you use a software package.

1) A mechanical system consists of an elastic spring with a constant of 250 N/m supporting a 2 kg mass. The mass is given an initial velocity of 5 m/s in the direction of positive displacement. For this system

a) determine the response, x(t) of the system for

i) $\zeta = 1$

ii) $\zeta = 2$

b) plot both response curves on the same displacement vs. time graph for $0 \le t \le 2$ s.

2) Responses of a SDOF system to different forcings ($f_1(t)$, $f_2(t)$, $f_3(t)$, $f_4(t)$) at the same frequency are given as follows:

$$x_1(t) = 3\cos 20t$$
$$x_2(t) = -4\sin 20t$$
$$x_3(t) = 1.5\sin(20t - \pi/6)$$
$$x_3(t) = -2\cos 20t$$

Find the response of the same system subjected all forcings simultaneously. (Use complex functions in your solution – any other solution will not be credited)