ME 352 Problem Set 5 due noon, 3 November 2008

This assignment is for extra credit only. Points earned on this assignment will be added to your point total for all homework problems. The total number of points that can possibly be earned will not increase.

Quick Questions

In the textbook problem 5.21, the following formula is given for the optimum damping ratio ξ of a spring-mass-damper system

$$\cos\left[4\xi\sqrt{1-\xi^2}\right] = -1 + 8\xi^2 - 8\xi^4 \qquad (\star)$$

1. **(5 points)** Rearrange Equation $(\star)$ into an equivalent form $f(\xi) = 0$. Derive the analytical formula for $f'(\xi)$.

2. **(10 points)** Use the results of the preceding exercise, and the `newton` function from the NMM Toolbox to find the two roots of your $f(\xi)$. List the m-file function for computing $f(\xi)$ and $f'(\xi)$. Show the MATLAB statements (or m-file function) for calling `newton`, and show the results of running those statements.

3. **(10 points)** Use the built-in `fzero` command to find the two roots of Equation $(\star)$. List the m-file function for computing $f(\xi)$. Show the MATLAB statements (or m-file function) for calling `fzero`, and show the results of running those statements.