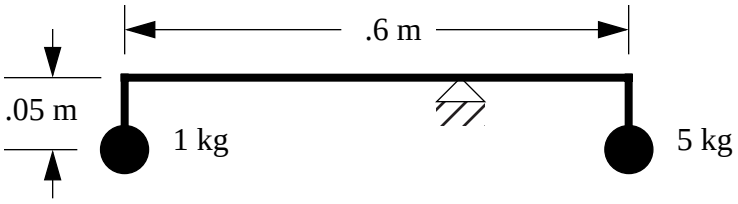
ME 460/660 Exam 1, Fall ‘96

One formula sheet. Front and back. No examples. No derivations. It must be turned in with the exam.

1) Find the free response of the following system: m = 10 kg, k = 500 N/m, c = 50 kg/s. Assume initial conditions of $x(0)$ = 0 m and $v(0)$ = 0.1 m/s. 20 points

2) Can the frequency of oscillation (free response frequency) for a viscously damped system be changed without changing the decay envelope? How? Derive the constraint on the system parameters (m, c, and k). 20 points

3) Derive the equation of motion for the following balance. Assume that the weights always hang straight down and that the weights are balanced. 20 points



Bonus: What is the frequency of the maximum response of a damped SDOF system to a harmonic excitation? Use correct units. 5 points.