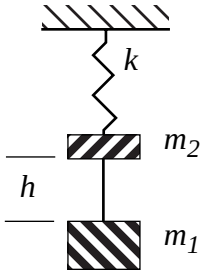
ME 460/660 Exam 1, Spring ‘96

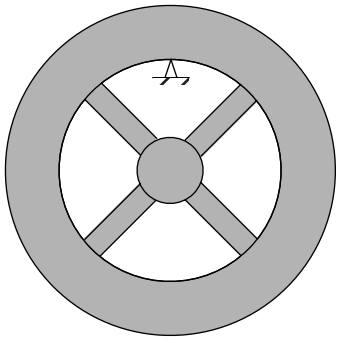
One cheat sheet. Front and back. No examples. No derivations. It must be turned in with the exam.

1) Choose m, c, and k such that a system with initial conditions of $x_0 = 0$ and $v_0 = 10$ mm/s does not exceed a displacement of 1 mm. The mass is restricted to values between 10 kg < m <15 kg.

2) A mass m_1 hangs from a spring k (N/m) and is in static equilibrium. A second mass m_2 drops through a height h from above m_1 and sticks to m_1 without rebound. Determine the subsequent motion. (Hint: Apply conservation of momentum at the instant of impact)



3) A flywheel weighing 980 N was allowed to swing as a pendulum about a knife edge at the inner side of the rim as shown below. If the measured period of oscillation was 1.28 s, determine the moment of inertia of the flywheel about its center.



4) A weight is attached to a spring of stiffness 525 N/m and a dashpot with unknown damping. When the weight is displaced and released, the period of vibration is found to be 1.8 sec, and the ratio of consecutive peak amplitudes is 4.2 to 1.0. Determine the amplitude and phase when a force $F = 2 \cos 3t$ acts on the system.