1. Consider the SDOF shown below with the following properties: \( m = 2 \text{ k.s}^2/\text{in} \) and \( k = 20 \text{ k/in} \). If this system is subjected to resonant harmonic loading \((r = 1)\) starting from "at rest" conditions, determine the value of the response ratio \( R(t) = \frac{y(t)}{y_{st}} \) after four cycles \((\omega t = 8\pi)\), assuming
   
   a. \( c = 0 \)
   b. \( c = 0.5 \text{ k.sec/in} \)
   c. \( c = 2.0 \text{ k.sec/in} \)

![SDOF diagram]

2. A control console containing delicate instrumentation is to be located on the floor of a test laboratory where it has been determined that the floor slab is vibrating vertically with amplitude of 0.03 in at 20 Hz. If the weight of the console is 800 lb, determine the stiffness of the vibration isolation system required to reduce the vertical motion amplitude of the console to 0.005 in.

3. A delicate instrument to be spring mounted to the floor of a test laboratory where it has been determined that the floor vibrates vertically with harmonic motion of amplitude 0.1 in at 10 cps. If the instrument weighs 100 lb, determine the stiffness of the isolation springs required to reduce the vertical motion amplitude of the instrument to 0.01 in. Neglect damping.