

Math/Phys 4530 Midterm Exam

FALL 2011

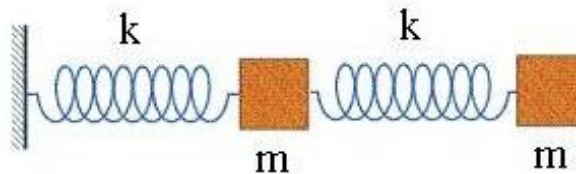
Dr. Robinson

Name _____

Part I. Due 9:00 am, Friday, October 7.

Instructions: You must work alone on this portion of the test. You may use your text and any other books or on-line resources you can find, but you must provide references if you do so. You may freely use Maple or Mathematica or other computer programs, but you should provide documentation (*i.e.*, print or e-mail the worksheet) if you do. You may use your class notes, and you may ask questions of me. You *may not* discuss this portion of the test among yourselves, with other professors, or with anyone other than me.

1. Problem #33 on page 43 of the text.
2. Find the characteristic frequencies and describe the characteristic modes of vibration for the system of masses and springs pictured below.



3. Problem #29 on page 618 of the text. You may take the result of Problem 20 on page 617, namely that the Bessel function of the first kind $J_n(x)$ has the integral representation

$$J_n(x) = \frac{1}{\pi} \int_0^\pi \cos(n\theta - x \sin \theta) d\theta$$

for all integers n , as given.