Problem Set #1 SUS PHYS 2, due beginning of class Monday, April 6.

1) In the video, I put a 200 g mass on a spring and it stretched about 25 cm. Then I stretched the spring another 10 cm. Find the following in any order:
   1) The speed of the mass when it passes through the equilibrium point.
   2) The speed of the mass when it passes through x = 5 cm.
   3) The spring constant.
   4) The period of the oscillation.
   5) Omega of the oscillation
   6) The acceleration of the mass at the lowest and highest points.
   7) The energy stored in the oscillator.
   8) If I let the mass go at t = 0 seconds from the bottom, x = -10 cm, what is the equation of motion of the mass on the spring?
2) Let's say I have a mass on a spring bouncing with an *angular frequency* (omega) of 10 radians per second. I start it at a displacement of x = + 20 cm, moving upwards at 2 m/s.
   a) Please find *and graph* the function of the displacement, velocity, and acceleration as a function of time. Please graph them directly above each other with the same time scales. What do you notice about the graphs?
   b) How would the function change if instead of being released at t = 0s, it was in the above state at t = 0.2 s?
   c) Are you able to find the energy of the system? Why or why not?

   I think you know to use the kinematics lens because we are just describing motion. You should be able to draw the three graphs reasonably well just by thinking about this, but to find the exact functions requires some math – which is a required part of this class, and will come in handy later. You may find some reasonable help from:
   https://www.youtube.com/watch?v=nkFhA5dKKvg
   Also, it is worth looking at your textbook, the last page of section 16.3
   I request that you try to draw the rough form of the displacement, velocity, and acceleration before doing too much math. But make sure you think about what the mass is doing while you draw the graphs.