For each of the problems below, solve the original problem from the textbook and solve/answer the additional questions.

1. Problem 14.34
    a. Write the equation of motion for position, velocity, acceleration, force and draw their graphs separately (one below the other with the time axis remaining the same in length) and one graph for (kinetic energy, potential energy and total energy). All graphs should show at least 2 complete time periods. Make sure you have calculated numbers for all relevant points on the graph. (it might just be easier to use Excel).
2. Problem 14.30
    a. Write the equation of motion for position, velocity, acceleration, force and draw their graphs separately (one below the other with the time axis remaining the same in length) and one graph for (kinetic energy, potential energy and total energy). All graphs should show at least 2 complete time periods. Make sure you have calculated numbers for all relevant points on the graph. (it might just be easier to use Excel).
3. Problem 14.49
4. Problem 14.45 (But use the following information).
   Consider the unstretched length of the spring to be 40 cm when suspended from the ceiling. Ignore the weight of the spring.
    a. Find the equilibrium position (where the net force is zero) of the spring relative to the ceiling. At t=0s the block is 20 cm below the equilibrium position and moving upward with a speed of 100 cm/s. Calculate the bottom most point below the equilibrium position that the block reaches (which is the Amplitude of motion). Call this the point of zero gravitational potential energy. Using this information the answer the remaining questions too.
    b. Find the oscillation frequency.
    c. Distance from the equilibrium position when the speed is 50 cm/s
    d. Distance from the equilibrium at t=1.0 s.
    e. Write the equation of motion for position, velocity, acceleration, the *force exerted by the spring* and draw their graphs separately (one below the other with the time axis remaining the same in length) and one graph for (kinetic energy, spring potential energy potential energy gravitational potential energy and total energy). All graphs should show at least 2 complete time periods. Make sure you have calculated numbers for all relevant points on the graph. (it might just be easier to use Excel).