PHYS 172 Problem of the Week #4 – Spring 2012

A spring has a relaxed length of 12 cm. You suspend it vertically and hang a 35 gram mass from it, and you observe that with the mass hanging motionless the spring is 19 cm long. You then pull down on the mass until the spring is 22 cm long and you release the mass without giving it any initial speed.

a. How long does it take the mass to make a round trip, up and back down?

b. You stop the oscillation, you pull down on the mass until the spring is 25 cm long, and you release the mass without giving it any initial speed. Now how long does it take the mass to make a round trip, up and back down?

c. When the mass returns to the bottom (so again the spring is 25 cm long), the mass is momentarily at rest before continuing its oscillation. What is the magnitude of the net force at this instant?

d. You cut the spring into two equal lengths, each with relaxed length 6 cm. You take one of these half-length springs and hang the 35 gram mass from it. You then pull down on the mass until the spring is 9 cm long and you release the mass without giving it any initial speed. How long does it take the mass to make a round trip, up and back down?