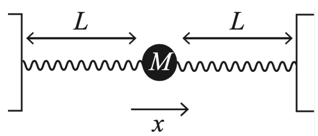
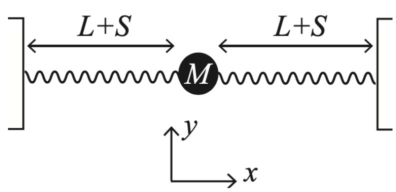
CMA A mass M is connected to two massless springs with the same spring constant k, as in the figures below. Originally the springs are not stretched and have length L.

a) First assume that the mass executes small oscillations along the x-axis. Write down the equation of motion and find the angular frequency ω for the oscillation.



b) Now both springs are stretched by the same amount S and the mass M undergoes small oscillations in the $x-y$ plane. Find the potential energy of the system $V(x,y)-V(0,0)$ to second order in x and y. Calculate the normal frequencies and normal modes. (**Hint**: Use symmetry to argue that there is no xy term, so you can compute the y^2 term by assuming that $x=0$, and similarly for the x^2 term.)



c) When both springs are stretched by the same amount S as in (b), the mass undergoes circular motion with a small radius ρ in the $y-z$ plane perpendicular to the x axis. Determine the rotational frequency ω around the x-axis. Compare your ω with the result of (b) by relating the circular motion to your solutions to part (b).