2-

$$-m\ddot{y}-k\left(y+\left(L-L\_{0}\right)\right)+mg=0$$

$$mg=k\left(L-L\_{0}\right)\rightarrow m\ddot{y}+ky=0$$

1-

$$m\ddot{x\_{1}}=-3kx\_{1}+2k(x\_{2}-x\_{1})$$

$$m\ddot{x\_{2}}=-2k(x\_{2}-x\_{1})+k(x\_{3}-x\_{2})$$

$$m\ddot{x\_{3}}=-k(x\_{3}-x\_{2})$$