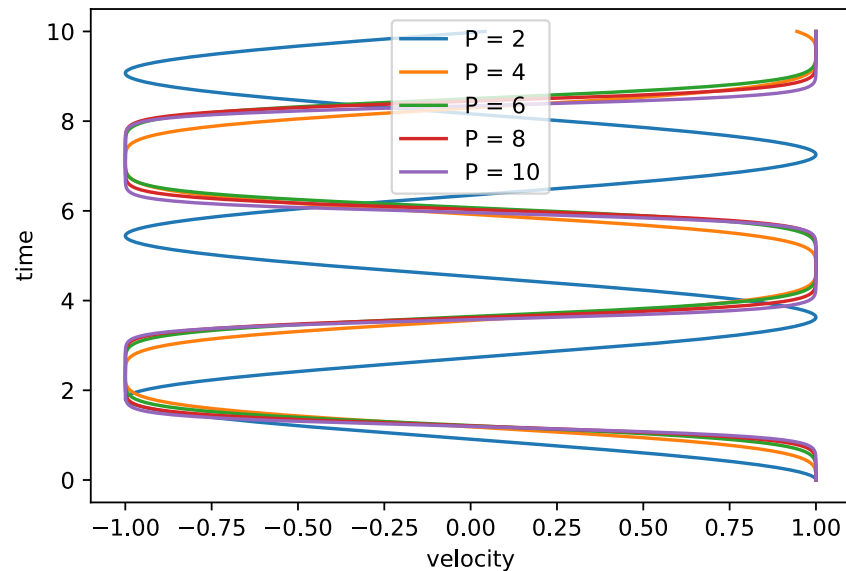
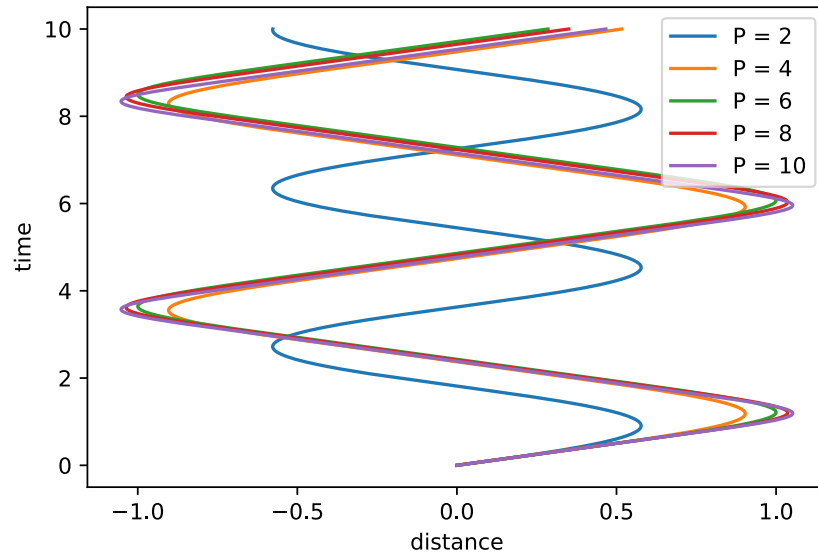


- (1) When $p = 2$, the object's position and velocity are reminiscent of a sinusoidal function, as we would expect considering when $p = 2$, the potential energy function becomes

$V(x) = \frac{1}{2}kx^2$, which gives the potential energy of a harmonic oscillator obeying Hooke's law.

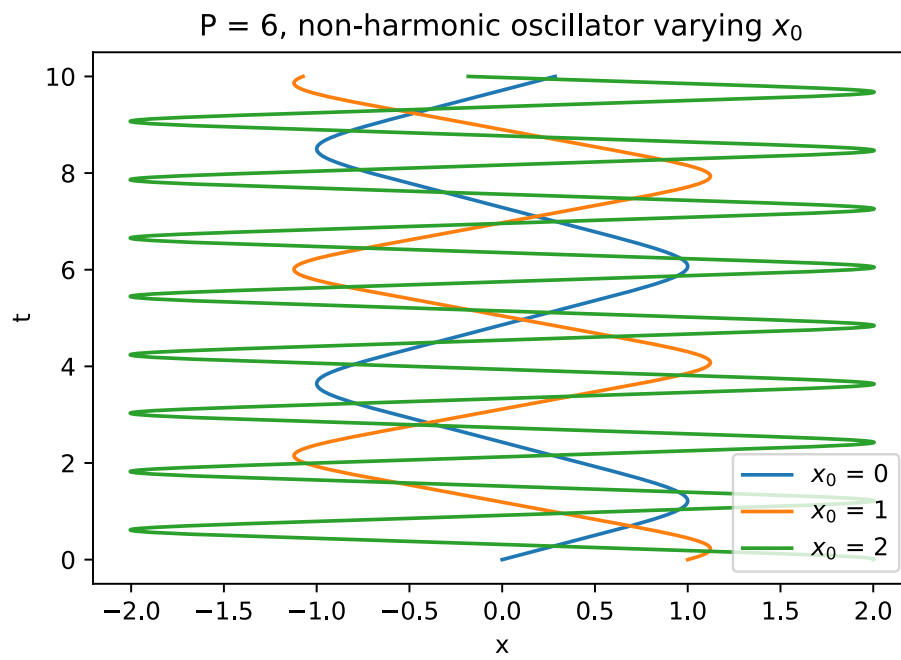
(2)



Regardless of the p -value, the functions remain periodic.

- (3) The particle has the highest velocity as it passes through $x = 0$. This makes sense since at this point there is no spring potential energy, and all of the energy is in the kinetic energy of the object on the spring.

(4)



When $p = 6$, the spring is a non-harmonic system, you can see as the initial amplitude increases, the frequency increases, and therefore the period decreases.