

25/25

PHYS 304 Assignment 0

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Required (Graded) Exercises

My favorite equations are:

$$\mathbf{F} = -k\mathbf{x} = m \frac{d^2 x}{dt^2} \quad \checkmark \quad (1)$$

This describes the one-dimensional simple harmonic motion. With Newton's 2nd Law and Hooke's Law, we equal the spring force to the net force on an object with mass m . \mathbf{x} represents the displacement from the equilibrium, and k is the spring constant. If we divide m on both sides, we get a differential equation, ✓

$$-\frac{k}{m}\mathbf{x} = \frac{d^2 x}{dt^2} \quad (2)$$

which leads to a solution

$$x(t) = c_1 \sin(\omega t) + c_2 \cos(\omega t) \quad (3)$$

where $\omega = \sqrt{k/m}$

One way to prove (3) is the right solution for (2) is to substitute (3) back and see if the right-hand side is equal to the left-hand side.

This set of equations is essential in physics. The simplified spring graph can be used to understand many complicated phenomena, such as quantum wavefunctions, spin systems, etc.

Required (Ungraded) Exercises

- I have completed all Unix tutorials on Moodle.
- I have completed all LaTeX on Moodle.
- I have completed github tutorials on Moodle.
- I have installed python on your computer.