Contents

1 General Information

1.1 Vectors

2 Kinematics

Defn 1 (Kinematics). *Kinematics* is a way to describe macroscopic motion with equations. This includes anything moving, falling, thrown, shot, launched, etc. This forms the fundamental basis for all of classical mechanics.

2.1 1-D Kinematics

Defn 2 (1-D Displacement). *One dimensional displacement* is calculated based on the change in position of the 'thing.'

$$s = x_2 - x_1 \tag{2.1}$$

Remark 2.1. *Displacement is different than path!* Displacement is the change in position of an object. Path is the length of the path takes between its starting and end point.

Defn 3 (1-D Velocity). *One dimensional velocity* is calculated as the displacement per unit time. There is instantaneous velocity and average velocity. Average velocity is calculated with Equation (2.2).

$$v = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1} \tag{2.2}$$

Instantaneous velocity is calculated by reducing the time interval Δt to 0. This can be summarized in Equation (2.3).

$$v = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt} \tag{2.3}$$

Defn 4 (Acceleration). *One dimesional acceleration* is the change in velocity over time. Again, there is average acceleration and instantaneous acceleration. Average acceleration is calculated with Equation (2.4)

$$a = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1} \tag{2.4}$$

Instantaneous acceleration is calculated by reducing the time interval Δt to 0. This can be summarized by Equation (2.5).

$$a = \lim_{\Delta t \to 0} \frac{\Delta v}{\Delta t} = \frac{dv}{dt} = \frac{d^2x}{dt^2} \tag{2.5}$$