# Prelab No. 1

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11th September 2024

## 1 Particle Motion given by $x(t) = 7.8 + 9.2t - 2.1t^3$

### 1.1 Instantaneous velocity

The instantaneous velocity of the particle can be determined by the first derivative of the equation of motion. The motion of the particle is defined as the relation

$$x(t) = 7.8 + 9.2t - 2.1t^3, \tag{1}$$

the derivative of which can be found via the power rule:

$$\dot{x}(t) = 9.2 - 6.3t^2. \tag{2}$$

The instantaneous velocity given by $\dot{x}(t)$ is time-dependent, as the velocity is not constant over time.

### 1.2 Zero Velocity

The velocity of the particle can be found via

$$\dot{x}(t) = 9.2 - 6.3t^2. \tag{3}$$

The zero of this function that lies in the positive-time domain represents a velocity of zero. Thus, the time where $\dot{x}(t) = 0$ can be found by setting the function equal to zero and solving for $t$: