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**Goldstein Classical Mechanics Solutions Chapter 2**

Goldstein Classical Mechanics Notes

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May 30, 2004

## 1 Chapter 1: Elementary Principles

### 1.1 Mechanics of a Single Particle

Classical mechanics incorporates special relativity. 'Classical' refers to the conditions that 'quantum' mechanics.

Velocity:

$$v = \frac{dx}{dt}$$

Linear momentum:

$$p = mv$$

Force:

$$F = \frac{dp}{dt}$$

In most cases, mass is constant and force is simplified:

$$F = \frac{d}{dt}(mv) = m \frac{dv}{dt} = ma$$

Acceleration:

$$a = \frac{dv}{dt}$$

Newton's second law of motion holds in a reference frame that is inertial or Galilean.

Angular Momentum:

$$L = r \times p$$

Torque:

$$T = r \times F$$

Torque is the time derivative of angular momentum:

$$T = \frac{dL}{dt}$$