**Physics 4A**

**Motion in 2 and 3 Dimensions**

Motion in One Dimension
Motion in 2 and 3 Dimensions
Projectile Motion

**Motion in One Dimension**

\[ \Delta x = \bar{v}_x \Delta t \]
\[ \bar{a}_{ave} = \frac{\Delta \bar{v}}{\Delta t} \]

**Motion in Two and Three Dimensions**

\[ \bar{r} = x\hat{i} + y\hat{j} + z\hat{k} \]
\[ \Delta \bar{r} = \Delta x\hat{i} + \Delta y\hat{j} + \Delta z\hat{k} \]

Displacement, velocity, and acceleration are defined the same as in Chapter 2, except now in three dimensions.

**Displacement**
\[ \Delta \bar{r} = \bar{r}_2 - \bar{r}_1 \]

**Position**
\[ \bar{r} = x\hat{i} + y\hat{j} + z\hat{k} \]
Projectile motion can be considered the superposition of both a horizontal motion and a vertical motion.

In projectile motion, the horizontal and vertical motions are independent of each other.