von Neumann: father of computer science.

CHAPTER 2

§2.1 - 1. dimension done it

§2.2 - Uniform motion

\[ \overrightarrow{a} = \frac{\overrightarrow{v}}{\Delta t} = 0 \]

1 dimension, generic direction \( S \).

\[ v_s = \frac{\Delta s}{\Delta t} \]

§2.3 - Instantaneous Velocity

\[ v_{s, \text{avg}} = \frac{\Delta s}{\Delta t} \]
\[ v_{\text{inst}} = \lim_{\Delta t \to 0} \frac{\Delta s}{\Delta t} = \frac{ds}{dt} \]

- slope at tangent on \( s-t \) graph.

Direct measurement of \( v_{\text{avg}} \)

World is continuous.

Math - talk - distance must differentiable everywhere

\[
\begin{cases} 
\text{§2.4 - Posn from Velocity} \\
\text{§2.5 - Const. Accel} \\
\end{cases}
\]

\[ s \]

\[ t \]

tangent

slope = \frac{ds}{dt} = v_{\text{inst}} +
Subsection "A Little More Calculus: Integrals"

Finding area under curves

Integration! Language

\[ \{ \section{5.25 - Const Accel} \]
\[ \section{5.26 - Free Fall} \]
\[ a_3 = \text{constant} \]
\[ v_{yiF} = v_{yi} + a_3 t \]
\[ S_f = S_i + v_{ys} t + \frac{1}{2} a_3 t^2 \]

**Free Fall**

\[ a_y = -g \]
\[ g = 9.80 \text{ m/s}^2 \]

**Section 2.2 - Inclined Plane**

Use radian measure.
\[ a_s = g(\theta) \text{ - continuous} \]

\[ \text{simplest function} \quad a = g \sin(\theta) \]

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**Brief review of Vectors**

Useful notation: \( \hat{i}, \hat{j}, \hat{k} \)

\[ x \hat{i}, y \hat{j}, z \hat{k} \]

"hat" \( \hat{\cdot} \) \( \equiv \) vector of length 1