

Possible timeline for first lecture

9/26/2005

Title: Vectors and Dot Product

- 1. Vectors (10 minutes)
 - $\vec{v} = \vec{PQ} = \langle v_1, v_2, v_3 \rangle$ Vectors defined by 2 points PQ .
 - mention $|\vec{v}|$ length, $\vec{i}, \vec{j}, \vec{k}$, zero vector.
- 2. Dot product (5 minutes)
 - define it as $v_1w_1 + v_2w_2 + v_3w_3$.
 - basic properties
- 3. Angle formula (10 minutes)
 - $\vec{v} \cdot \vec{w} = |\vec{v}||\vec{w}| \cos(\alpha)$
 - derive from cos-formula
- 4. Computation of length and angle (5 minutes)
 - examples
- 5. Projection (10 minutes)
 - scalar projection
 - vector projection
- 6. Properties (10 minutes)
 - Pythagoras $(v - w) \cdot (v - w) = v \cdot v + w \cdot w$ if $v \cdot w = 0$.
 - Cauchy-Schwarz $|v \cdot w| \leq |v| |w|$.
 - Triangle inequality