1 Lecture review

1.1 Vectors

1. Vectors have a direction and magnitude.
   
   (a) If $v = \langle a_1, a_2, a_3 \rangle$, then its magnitude is $|v| = \sqrt{a_1^2 + a_2^2 + a_3^2}$.

2. Adding two vectors means adding their components.

   (a) If $v = \langle a_1, a_2, a_3 \rangle$ and $w = \langle b_1, b_2, b_3 \rangle$, then $v + w = \langle a_1 + b_1, a_2 + b_2, a_3 + b_3 \rangle$.

3. One can also apply scalar multiplication to vectors.

   (a) If $v = \langle a_1, a_2, a_3 \rangle$ and $\lambda$ is a scalar, then $\lambda v = \langle \lambda a_1, \lambda a_2, \lambda a_3 \rangle$.

1.2 Dot products

1. The dot product of two vectors is a scalar. If $v = \langle a_1, a_2, a_3 \rangle$ and $w = \langle b_1, b_2, a_3 \rangle$, then

   \[ v \cdot w = a_1 b_1 + a_2 b_2 + a_3 b_3. \]

2. It satisfies the following properties

   (a) $v \cdot v = |v|^2$.

   (b) $a \cdot b = b \cdot a$.

   (c) $a \cdot (b + c) = a \cdot b + a \cdot c$.

3. If $\theta$ is the angle between vectors $a$ and $b$, then

   \[ a \cdot b = |a| \cdot |b| \cdot \cos \theta. \]
2 Problems

1. See supplementary notes. (Suggested problems will be written on board.)

3 Answers

1. See supplementary notes. (Suggested problems will be written on board.)