5/15 Lecture

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1 Dot products

1.1 equations

$$\vec{A} \cdot \vec{B} = s \tag{1}$$

$$\vec{A} \cdot \vec{B} = |A||B|cos(\theta) \tag{2}$$

$$\vec{A} \cdot \vec{B} = A_{\parallel} B = A B_{\parallel} = AB cos(\theta) \tag{3}$$

$$\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k} = (A_x, A_y, A_z) \tag{4}$$

$$\vec{B} = B_x \hat{i} + B_y \hat{j} + B_z \hat{k} = (B_x, B_y, B_z) \tag{5}$$

$$s = \vec{A} \cdot \vec{B} = A_x B_x + A_y B_y + A_z B_z \tag{6}$$

1.2 i, j, k components

$$\hat{i} \cdot \hat{i} = (\hat{i})^2 = 1 \tag{7}$$

$$\hat{j} \cdot \hat{j} = (\hat{j})^2 = 1 \tag{8}$$

$$\hat{k} \cdot \hat{k} = (\hat{k})^2 = 1 \tag{9}$$

$$\hat{i} \cdot \hat{j} = 0 \tag{10}$$

$$\hat{i} \cdot \hat{k} = 0 \tag{11}$$

2 Cross products

2.1 equations

$$\hat{i} \times \hat{j} = \hat{k} \tag{12}$$

$$\hat{j} \times \hat{k} = \hat{i} \tag{13}$$

$$\hat{k} \times \hat{i} = \hat{j} \tag{14}$$

order matters

$$\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A} \tag{15}$$

$$\hat{k} \times \hat{i} = \hat{j} \tag{16}$$

$$\hat{i} \times \hat{k} = -\hat{j} \tag{17}$$