

Worksheet #16

- (1) Let $\mathbf{a} = -2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{b} = 2\mathbf{i} - 3\mathbf{j}$ and $\mathbf{c} = -5\mathbf{j}$. Find the following: (a) $2\mathbf{a} - 4\mathbf{b}$ (b) $\mathbf{a} \cdot \mathbf{b}$
(c) $|\mathbf{a}| \mathbf{c} \cdot \mathbf{a}$
- (2) Find the cosine of the angle between \mathbf{a} and \mathbf{b} and make a sketch.
(a) $\mathbf{a} = \langle -1, 2 \rangle$ $\mathbf{b} = \langle 6, 0 \rangle$ (b) $\mathbf{a} = \langle 4, -7 \rangle$ $\mathbf{b} = \langle -8, 10 \rangle$
- (3) Write the vector \vec{AB} in the form $\mathbf{a} = a_1\mathbf{i} + a_2\mathbf{j}$ (a) $A(2, 2), B(-3, 4)$ (b) $A(0, 4), B(-6, 0)$
- (4) Show that the vectors $\langle 6, 3 \rangle$ and $\langle -1, 2 \rangle$ are perpendicular.
- (5) Find the scalar and vector projections of \mathbf{b} onto \mathbf{a} where $\mathbf{a} = \langle 1, 1, 1 \rangle$ and $\mathbf{b} = \langle 1, -1, 1 \rangle$. Also, find the orthogonal projection.