Recitation #25: Vectors in the plane

Warm up:

(a) What is the difference between the notations $\hat{\imath}$, $\hat{\jmath}$, $\hat{u}$ and $\mathbf{i}, \mathbf{j}, \mathbf{u}$?

(b) Sketch the vectors $\mathbf{u} = \langle 1, -1 \rangle$ and $\mathbf{v} = \langle 2, 0 \rangle$. Now using your sketch of these vectors, sketch $\mathbf{u} - 2\mathbf{v}$.

Group work:

Problem 1 *Suppose that* $\mathbf{u} = \langle 5, -1 \rangle$ *and* $\mathbf{v} = \langle 2, 3 \rangle$. *Find the following quantities:*

(a) $-\mathbf{v}$

(b) $3\mathbf{u} - 4\mathbf{v}$

(c) $|\mathbf{u}|$

(d) $|\mathbf{u} - 2\mathbf{v}|$

Problem 2 *Suppose that* $\mathbf{u} = 3\mathbf{i} - 4\mathbf{j}$. *Find the following:*

(a) *A unit vector in the same direction of* $\mathbf{u}$.

(b) *All unit vectors parallel to* $\mathbf{u}$. *(How does differ from part (a)?)*

(c) *Two vector parallel to* $\mathbf{u}$ *with length 10.*

Problem 3 *Assume that* $\vec{u} = \frac{1}{2}\hat{\imath} + \frac{\sqrt{3}}{2}\hat{\jmath}$ *and* $\vec{v} = \frac{\sqrt{3}}{2}\hat{\imath} - \frac{1}{2}\hat{\jmath}$.

(a) *Show that* $\vec{u}$ *and* $\vec{v}$ *are unit vectors.*

(b) *Write* $\hat{\imath}$ *as* $a_1\vec{u} + b_1\vec{v}$ *for some real numbers* a_1 *and* b_1.

(c) *Write* $\hat{\jmath}$ *as* $a_2\vec{u} + b_2\vec{v}$ *for some real numbers* a_2 *and* b_2.
