

(5)

Thm If $\vec{v} = a_1 \vec{i} + b_1 \vec{j}$

$$\vec{w} = a_2 \vec{i} + b_2 \vec{j}$$

Then $\vec{v} = \vec{w} \iff a_1 = a_2$ and $b_1 = b_2$

Notes

① $\|\vec{v}\| = \sqrt{a_1^2 + b_1^2}$

② $\vec{v} + \vec{w} = (a_1 + a_2) \vec{i} + (b_1 + b_2) \vec{j}$

③ $\alpha \vec{v} = (\alpha a_1) \vec{i} + (\alpha b_1) \vec{j}$

Ex If $\vec{v} = 3\vec{i} - \vec{j}$ and $\vec{w} = -2\vec{i} + 3\vec{j}$

Find

① $\vec{v} - \vec{w}$ ② $\|2\vec{w} - \vec{v}\|$ ③ $\|2\vec{v} - 3\vec{w}\|$

④ $\|2\vec{w}\| - \|\vec{v}\|$

Thm Unit vector in direction of \vec{v}

for non-zero vector \vec{v} , the vector

$\vec{u} = \frac{\vec{v}}{\|\vec{v}\|}$ is a unit vector that has the same direction as \vec{v}