성분을 이용한 내적의 공식
(The Formula of Dot Product Using Components)

The Formula of Dot Product Using Components

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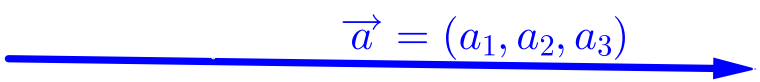

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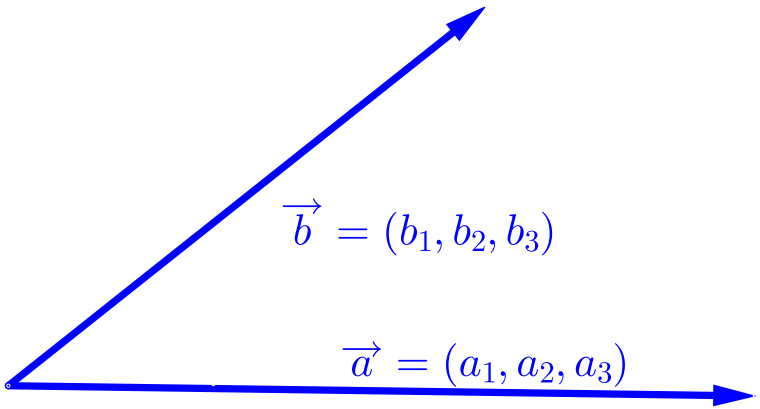

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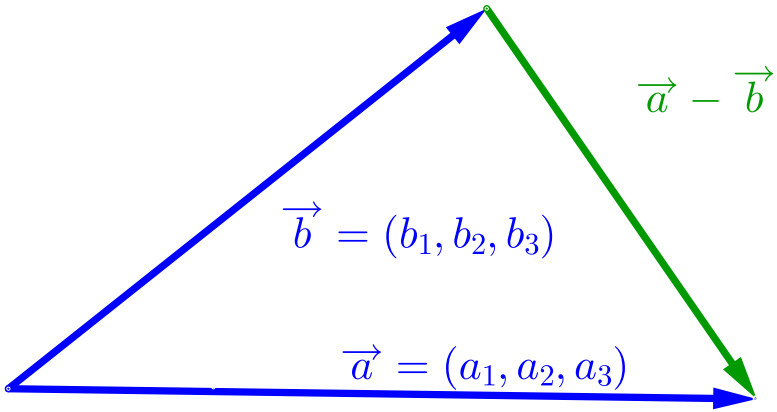

$$\overrightarrow{a} - \overrightarrow{b} = (a_1 - b_1, a_2 - b_2, a_3 - b_3)$$

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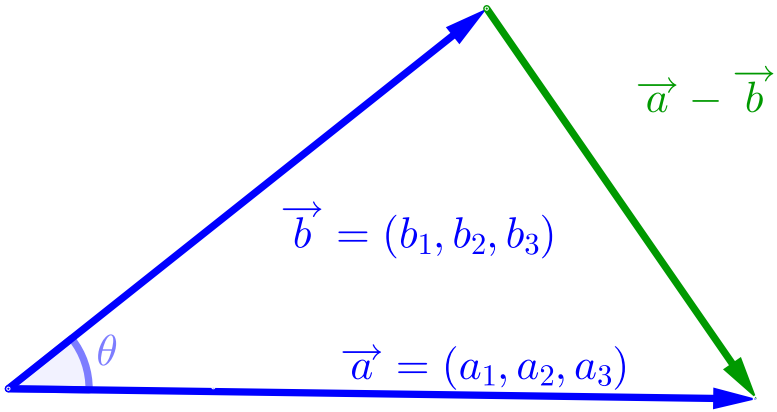

$$\vec{a} - \vec{b} = (a_1 - b_1, a_2 - b_2, a_3 - b_3)$$

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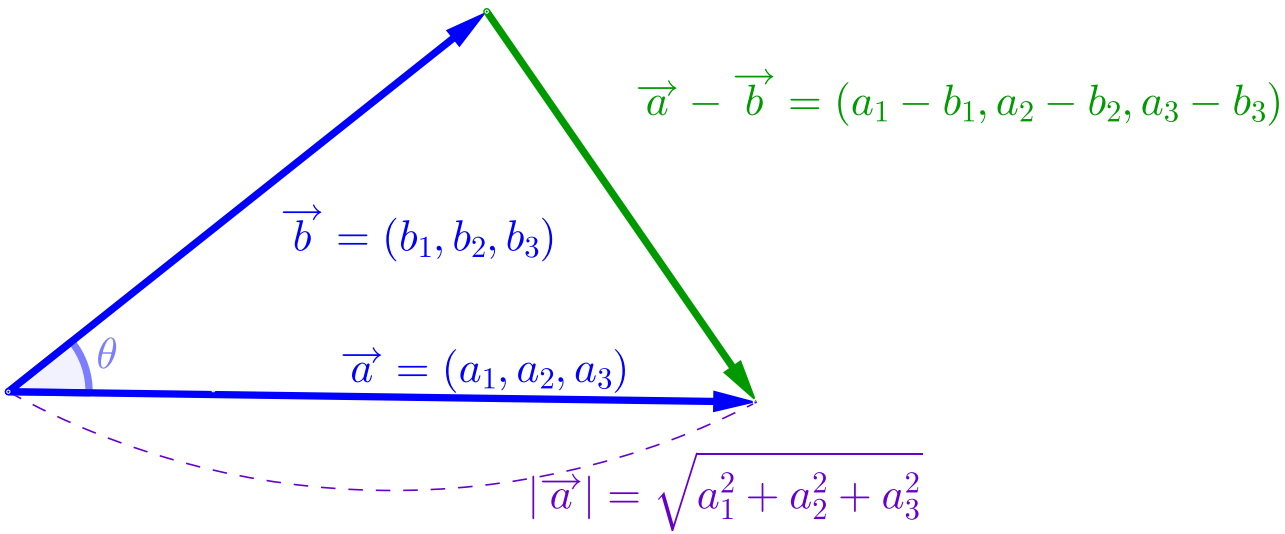

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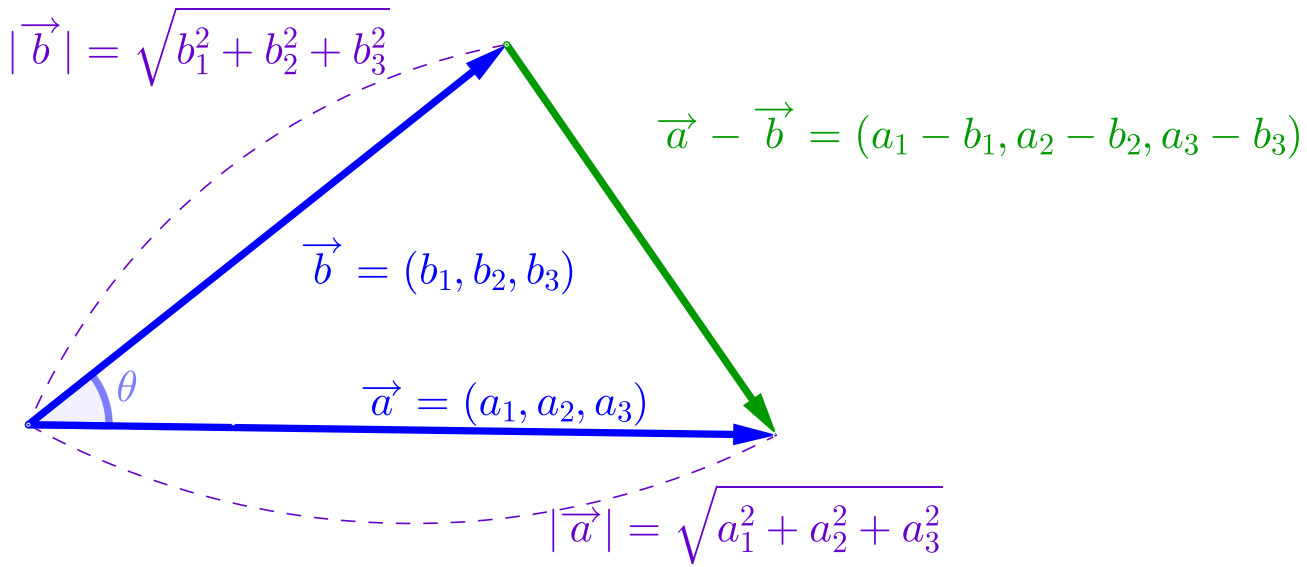

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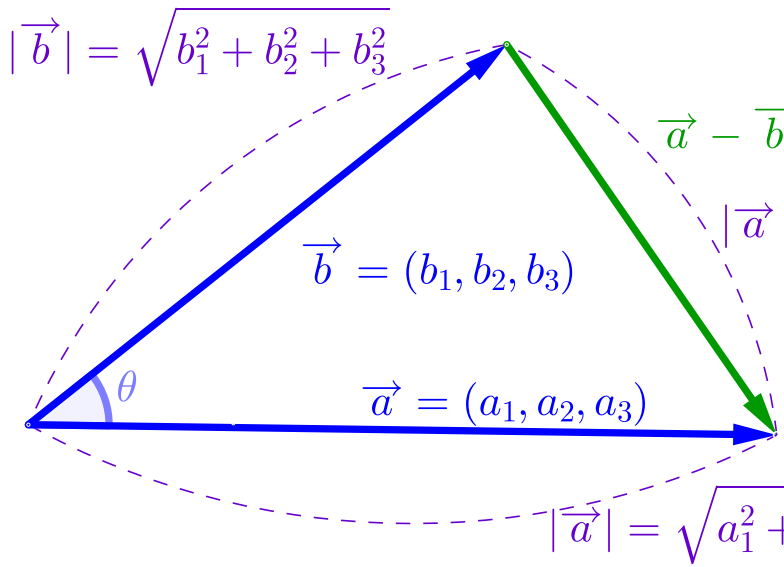

$$\overrightarrow{a} - \overrightarrow{b} = (a_1 - b_1, a_2 - b_2, a_3 - b_3)$$

$$|\overrightarrow{a} - \overrightarrow{b}| = \sqrt{(a_1 - b_1)^2 + (a_2 - b_2)^2 + (a_3 - b_3)^2}$$

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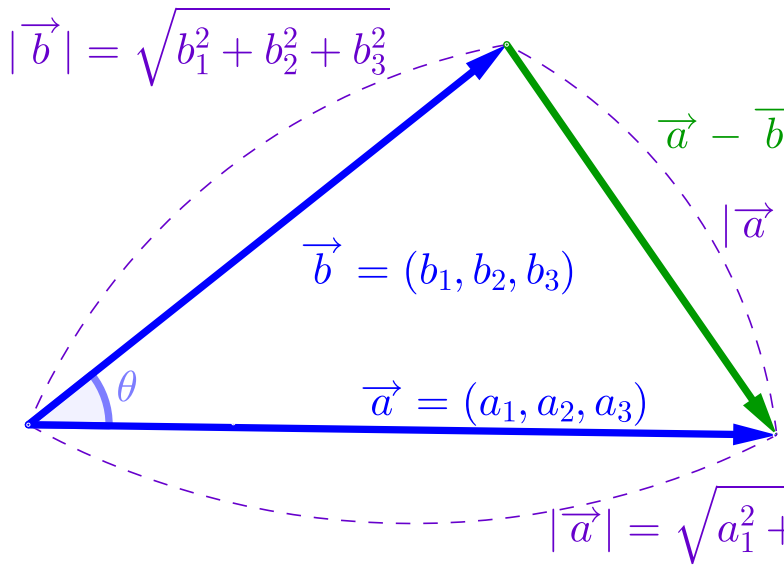

$|\vec{a} - \vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2 - 2|\vec{a}| \times |\vec{b}| \cos\theta$ (제2 코사인법칙)

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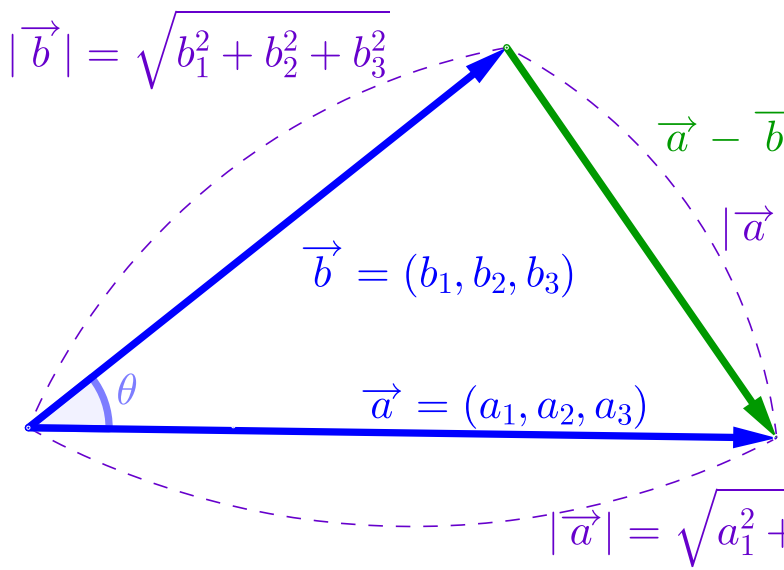
Start End



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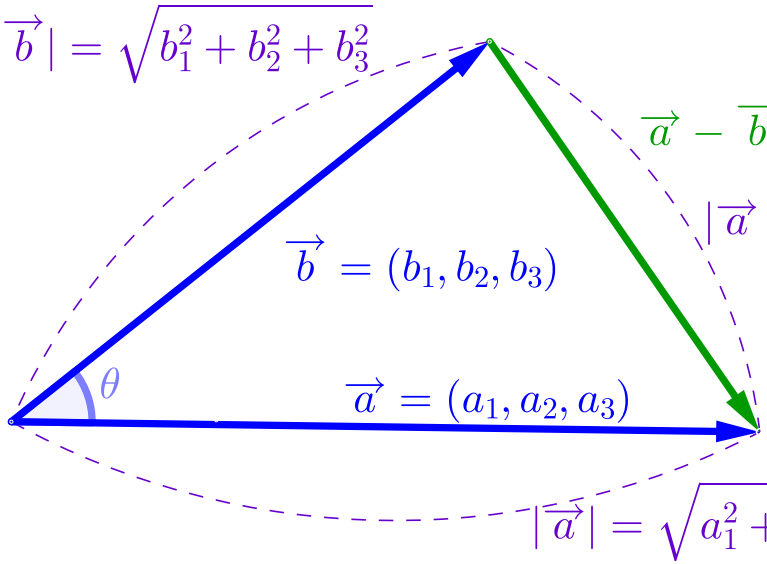

$$|\vec{a} - \vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2 - 2\left(\vec{a} \cdot \vec{b}\right)$$

$$\vec{a} \cdot \vec{b} = \frac{1}{2}\left(|\vec{a}|^2 + |\vec{b}|^2 - |\vec{a} - \vec{b}|^2\right)$$

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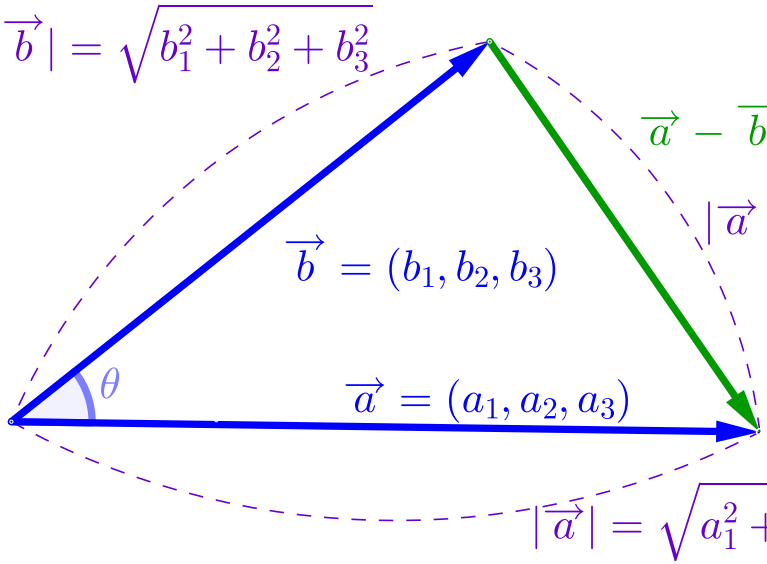

$$|\vec{a} - \vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2 - 2\left(\vec{a} \cdot \vec{b}\right)$$

$$\vec{a} \cdot \vec{b} = \frac{1}{2}\left(|\vec{a}|^2 + |\vec{b}|^2 - |\vec{a} - \vec{b}|^2\right)$$

$$= \frac{1}{2}\left\{a_1^2 + a_2^2 + a_3^2 + b_1^2 + b_2^2 + b_3^2 - (a_1 - b_1)^2 - (a_2 - b_2)^2 - (a_3 - b_3)^2\right\}$$

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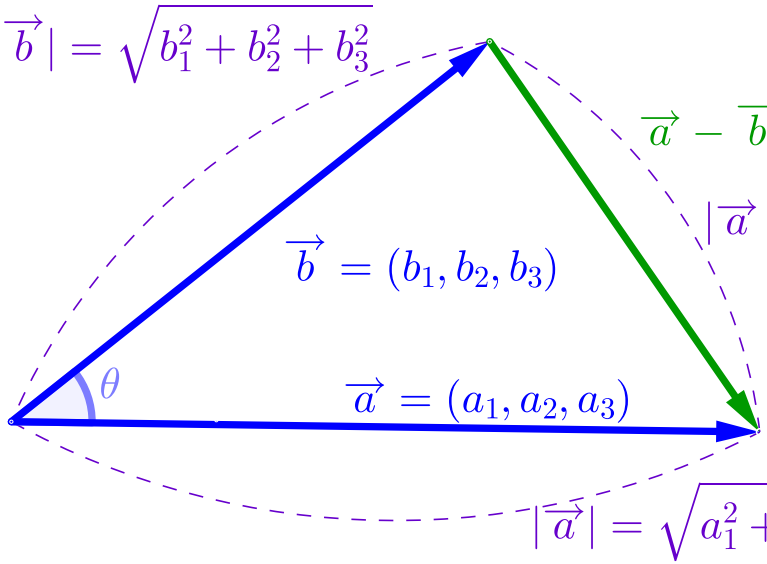

$$\vec{a} - \vec{b} = (a_1 - b_1, a_2 - b_2, a_3 - b_3)$$

$$|\vec{a} - \vec{b}| = \sqrt{(a_1 - b_1)^2 + (a_2 - b_2)^2 + (a_3 - b_3)^2}$$

$$|\vec{a} - \vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2 - 2\left(\vec{a} \cdot \vec{b}\right)$$

$$\vec{a} \cdot \vec{b} = \frac{1}{2}\left(|\vec{a}|^2 + |\vec{b}|^2 - |\vec{a} - \vec{b}|^2\right)$$

$$= \frac{1}{2}\left\{a_1^2 + a_2^2 + a_3^2 + b_1^2 + b_2^2 + b_3^2 - (a_1 - b_1)^2 - (a_2 - b_2)^2 - (a_3 - b_3)^2\right\}$$

$$\therefore \vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$$

Github:
https://min7014.github.io/math20221101002.html

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and you can see a picture moving.