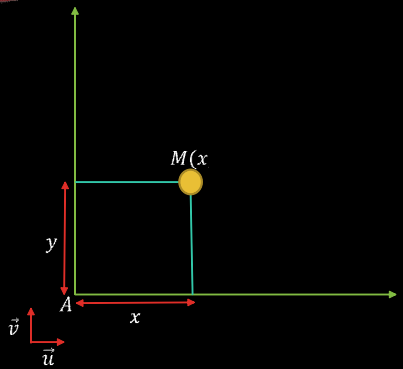
MATRIX

Scale

Rotation

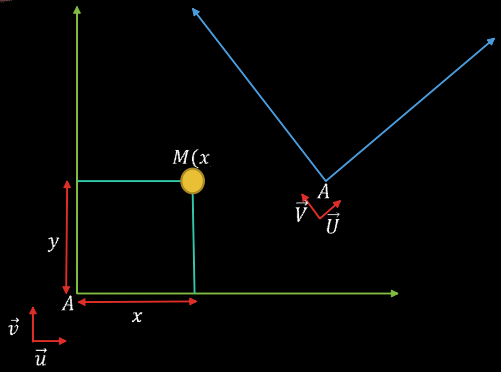
Translation

좌표계 변환



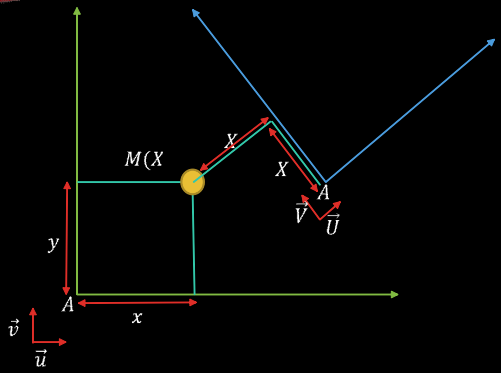
$$\overrightarrow{AM} = x \cdot \vec{u} + y \cdot \vec{v}$$

좌표계 변환



$$\overrightarrow{AM} = x \cdot \vec{u} + y \cdot \vec{v}$$

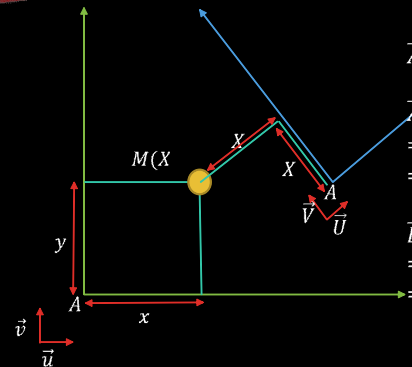
좌표계 변환



$$\overrightarrow{AM} = x \cdot \vec{u} + y \cdot \vec{v}$$

$$\overrightarrow{BM} = X \cdot \vec{U} + Y \cdot \vec{V}$$

좌표계 변환



$\overrightarrow{AM} = \overrightarrow{AB} + \overrightarrow{BM}$

$\overrightarrow{AM} = (x \cdot \vec{u} + y \cdot \vec{v})$
$= x(u_x \cdot \vec{U} + u_y \cdot \vec{V}) + y(v_x \cdot \vec{U} + v_y \cdot \vec{V})$
$= (xu_x + yv_x)\,\vec{U} + (xu_y + yv_y)\,\vec{V}$

$\overrightarrow{BM} = \overrightarrow{AM}$ - $\overrightarrow{AB} = \overrightarrow{AM} + \overrightarrow{BA}$
$= (xu_x + yv_x)\,\vec{U} + (xu_y + yv_y)\,\vec{V} + (Q_x\,\vec{U} + Q_y\,\vec{V})$
$= (xu_x + yv_x + Q_x)\,\vec{U} + (xu_y + yv_y + Q_y)\,\vec{V}$

$\vec{u} = u_X \cdot \vec{U} + u_Y \cdot \vec{V}$

$\vec{v} = v_X \cdot \vec{U} + v_Y \cdot \vec{V}$

$\overrightarrow{AM} = \overrightarrow{AB} + \overrightarrow{BM}$

$\overrightarrow{AM} = (x \cdot \vec{u} + y \cdot \vec{v})$
$= x(u_x \cdot \vec{U} + u_y \cdot \vec{V}) + y(v_x \cdot \vec{U} + v_y \cdot \vec{V})$
$= (xu_x + yv_x)\ \vec{U} + (xu_y + yv_y)\ \vec{V}$

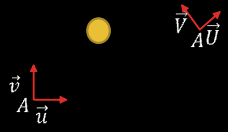
$\overrightarrow{BM} = \overrightarrow{AM} - \overrightarrow{AB} = \overrightarrow{AM} + \overrightarrow{BA}$
$= (xu_x + yv_x)\ \vec{U} + (xu_y + yv_y)\ \vec{V} + (Q_x\ \vec{U} + Q_y\ \vec{V})$
$= (xu_x + yv_x + Q_x)\ \vec{U} + (xu_y + yv_y + Q_y)\ \vec{V}$

좌표계 변환

$$\vec{v} = [x \quad y \quad z \quad 1] \qquad M = \begin{bmatrix} u_x & u_y & u_z & 0 \\ v_x & v_y & v_z & 0 \\ w_x & w_y & w_z & 0 \\ Q_x & Q_y & Q_z & 1 \end{bmatrix}$$

$$\vec{V} = [X \quad Y \quad Z \quad 1]$$

좌표계 변환



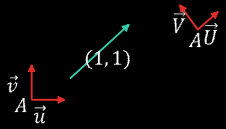
(B 좌표계 기준) $\vec{u}$, $\vec{v}$, $\vec{w}$의 성분

$$\vec{v} = [x \quad y \quad z \quad 1] \qquad M = \begin{bmatrix} u_x & u_y & u_z & 0 \\ v_x & v_y & v_z & 0 \\ w_x & w_y & w_z & 0 \\ Q_x & Q_y & Q_z & 1 \end{bmatrix}$$

(B 좌표계 기준) A의 좌표

$$\vec{V} = [X \quad Y \quad Z \quad 1]$$

좌표계 변환



(B 좌표계 기준) $\vec{u}$, $\vec{v}$, $\vec{w}$의 성분

무엇이 다를까?

$$\vec{v} = [x \quad y \quad z \quad \boxed{1}] \qquad M = \begin{bmatrix} u_x & u_y & u_z & 0 \\ v_x & v_y & v_z & 0 \\ w_x & w_y & w_z & 0 \\ Q_x & Q_y & Q_z & 1 \end{bmatrix}$$

(B 좌표계 기준) A의 좌표

$$\vec{V} = [X \quad Y \quad Z \quad 1]$$