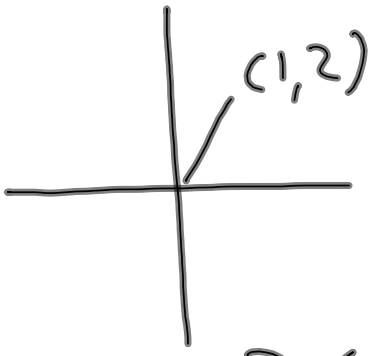
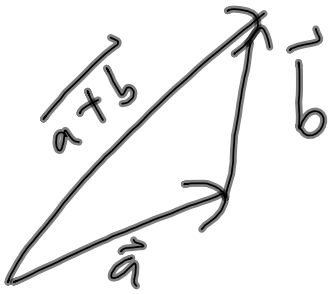
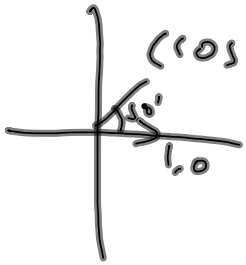




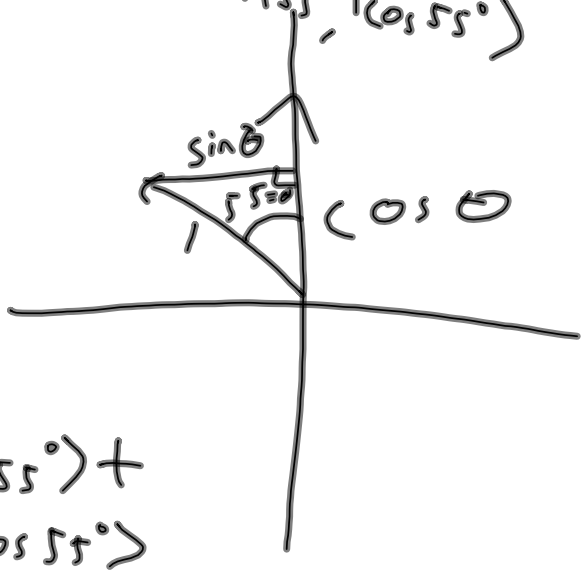
$$R(\vec{a})+R(\vec{b})=R(\vec{a}+\vec{b})$$

$$\langle 1,2\rangle=\langle 1,0\rangle+\langle 0,2\rangle$$

$$R\langle 1,2\rangle=R\langle 1,0\rangle+R\langle 0,2\rangle \hookrightarrow 2R\langle 0,1\rangle$$



$$2\langle -\sin 55^\circ, \cos 55^\circ\rangle$$



$$R\langle 1,2\rangle=$$
$$\langle \cos 55^\circ, \sin 55^\circ\rangle+$$
$$2\langle -\sin 55^\circ, \cos 55^\circ\rangle$$
$$(\cos 55^\circ - 2\sin 55^\circ,\ \sin 55^\circ + 2\cos 55^\circ)$$

Some transformations $T(x)$ are *not possible* with Ax:

(i) It is impossible to move the origin, since $A0 = 0$ for every matrix.

(ii) If the vector x goes to x', then $2x$ must go to $2x'$. in general cx must go to cx', since $A(cx) = c(Ax)$.

(iii) If the vectors x and y go to x' and y', then their sum $x+y$ must go to $x'+y'$—since $A(x+y) = Ax+Ay$.

rotation by α , then by β

$$r_\beta \cdot r_\alpha \to r_{\alpha+\beta}$$

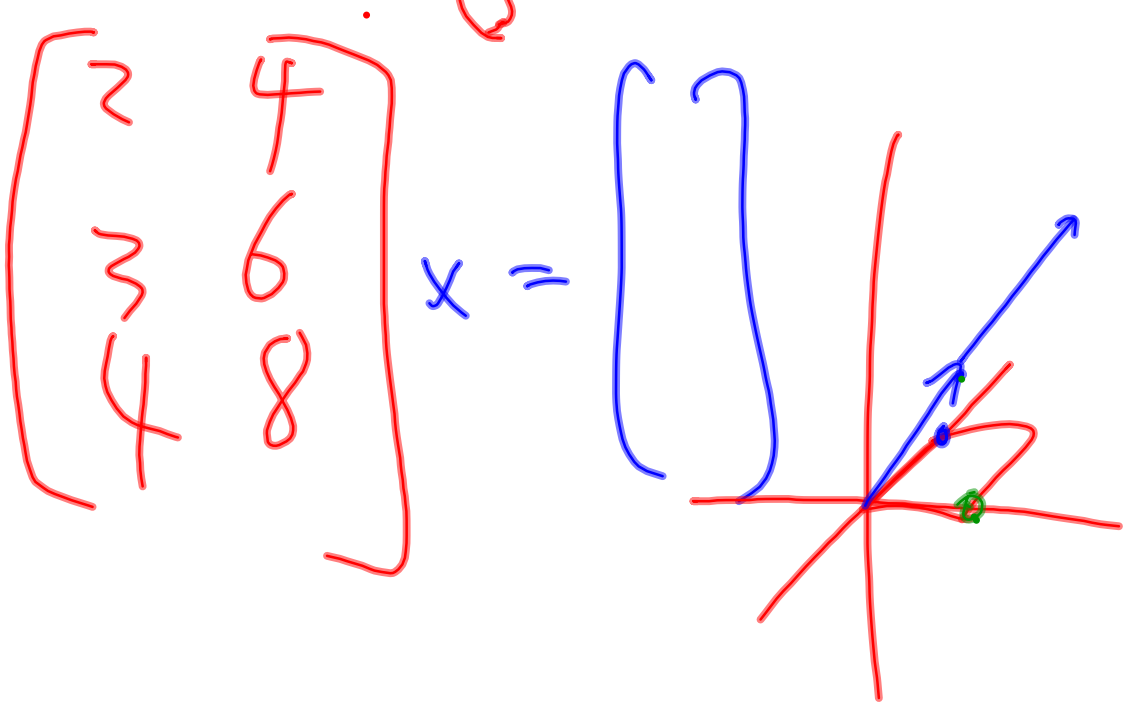
$$B(Ax) = Cx$$

$$\begin{bmatrix} \cos\beta & -\sin\beta \\ \sin\beta & \cos\beta \end{bmatrix} \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

$$\begin{bmatrix} \cos\alpha\cos\beta - \sin\alpha\sin\beta & -\cos\beta\sin\alpha - \sin\beta\cos\alpha \\ \sin\beta\cos\alpha + \cos\beta\sin\alpha & -\sin\alpha\sin\beta + \cos\alpha\cos\beta \end{bmatrix} = \begin{bmatrix} \cos(\alpha+\beta) & -\sin(\alpha+\beta) \\ \sin(\alpha+\beta) & \cos(\alpha+\beta) \end{bmatrix}$$

What linear transformation takes x_1 and x_2 to Ax_1 and Ax_2?

$$x_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \text{ goes to } Ax_1 = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}; \quad x_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \text{ goes to } Ax_2 = \begin{bmatrix} 4 \\ 6 \\ 8 \end{bmatrix}$$



When (3,1) is reflected about $y = 2x$, find its image.

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