MALAGON BAEZA ALAN ADRIAN 6CV2

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Assignment 2. Linear Algebra

Given vectors A, B, C, D, E, F, G perform and sketch the following inner products.

$A=[2\ 3]$ $B=[-2,3]$ $C=\begin{bmatrix}1\\2\\3\end{bmatrix}$ $D=[2][1]$ $E=[1\ 2\ 3]$

$F=\begin{pmatrix}1\\2\\3\end{pmatrix}$ $G=\begin{pmatrix}1\\1\\0\end{pmatrix}$

$X_1=(A)(C)$
$=(2\ 3)\begin{pmatrix}2\\3\end{pmatrix}$
$=2\cdot2+3\cdot3$
$=4+9=13$

$X_2=(A)(D)$
$=(2\ 3)(2\ 1)$
$=2(2)+(3)1$
$=4+3$
$=7$

$X_3=(B)(b)$
$=(-2,3)(2\ 1)$
$=(-2)2+3(1)$
$=-4+3$
$=-1$

$X_4=(E)(F)\begin{pmatrix}1\\2\\3\end{pmatrix}$
$=(1\ 2\ 3)\begin{pmatrix}1\\2\\3\end{pmatrix}$
$=1(1)+2(2)+3(3)$
$=1+4+9$
$=14$

$X_5=(E)(G)\begin{pmatrix}1\\1\\0\end{pmatrix}$
$=(1\ 2\ 3)\begin{pmatrix}1\\1\\0\end{pmatrix}$
$=1(1)+2(1)+3(0)$
$=1+2+0$
$=3$

What is X_6, if $(X_6)(G)=0$?

G is a matrix of the same length as X_6 full of 0's

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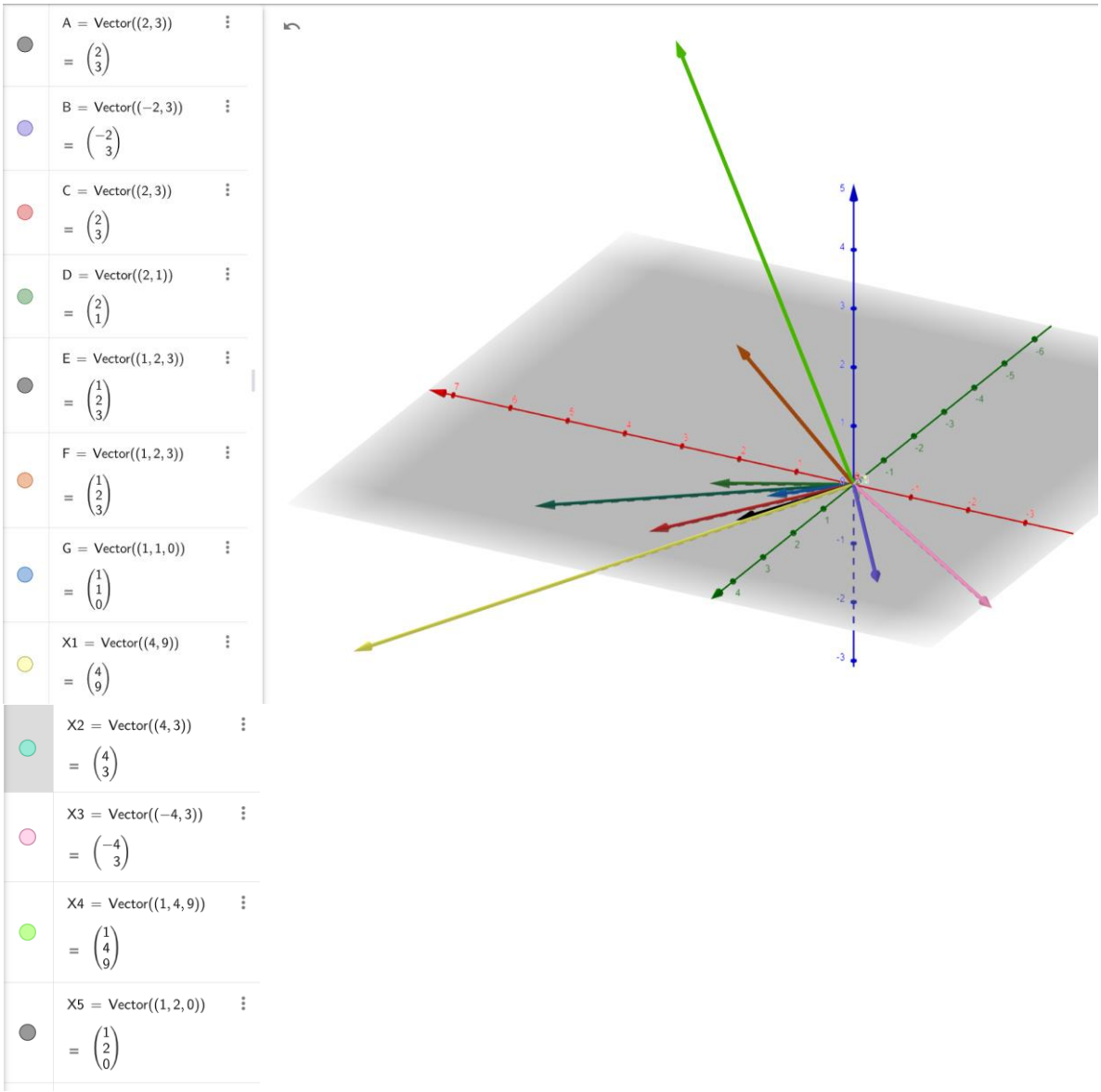

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Given a triangle with vertices A, B, C and the matrices S, M, R, T sketch the transformation that results from multiplying each matrix by the three vertices. for instance: $A' = (S)(A)$, $B' = (S)(B)$, $C' = (S)(C)$

$A = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ $B = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ $C = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $S = \begin{pmatrix} 2 & 0 \\ 0 & 0.5 \end{pmatrix}$ $M = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ $R = \begin{pmatrix} \cos(a) & -\sin(a) \\ \sin(a) & \cos(a) \end{pmatrix}$ $a = 60°$

$T = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

S A B C $= \begin{pmatrix} 2\cdot0+0\cdot0 & 2(1)+(0)(1) & 2(3)+0(1) \\ 0\cdot0+0.5(0) & 0(1)+0.5(1) & 0(3)+(0.5)(1) \end{pmatrix}$

$\begin{pmatrix} 2 & 0 \\ 0 & 0.5 \end{pmatrix}\begin{pmatrix} 0 & 1 & 3 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 2 & 6 \\ 0 & 0.5 & 0.5 \end{pmatrix}$

M

$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\begin{pmatrix} 0 & 1 & 3 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 1\cdot0+0\cdot0 & 1\cdot1+0\cdot1 & 1\cdot3+0\cdot1 \\ 0\cdot0+(-1)0 & 0\cdot1+(-1)1 & 0\cdot3+1(-1) \end{pmatrix}$

$= \begin{pmatrix} 0 & 1 & 3 \\ 0 & -1 & -1 \end{pmatrix}$

R

$\begin{pmatrix} \cos60 & -\sin60 \\ \sin60 & \cos60 \end{pmatrix}\begin{pmatrix} 0 & 1 & 3 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} \cos60\cdot0+(-\sin60)0 & \cos60\cdot1+(-\sin60)1 & \cos60\cdot3+(-\sin60)1 \\ \sin60\cdot0+\cos60\cdot0 & \sin60\cdot1+\cos60\cdot1 & \sin60\cdot3+\cos60\cdot1 \end{pmatrix}$

$= \begin{pmatrix} 0 & \cos60-\sin60 & 3\cos60-\sin60 \\ 0 & \sin60+\cos60 & 3\sin60+\cos60 \end{pmatrix}$

$= \begin{pmatrix} 0 & \frac{1}{2}-\frac{\sqrt{3}}{2} & 3\cdot\frac{1}{2}-\frac{\sqrt{3}}{2} \\ 0 & \frac{\sqrt{3}}{2}+\frac{1}{2} & \frac{3\cdot\sqrt{3}}{2}+\frac{1}{2} \end{pmatrix}$

$= \begin{pmatrix} 0 & \frac{1-\sqrt{3}}{2} & \frac{3-\sqrt{3}}{2} \\ 0 & \frac{\sqrt{3}+1}{2} & \frac{3\sqrt{3}+1}{2} \end{pmatrix}$

T

$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 0 & 1 & 3 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0\cdot0+1\cdot0 & 0\cdot1+1\cdot1 & 0\cdot3+1\cdot1 \\ 1\cdot0+0\cdot0 & 1\cdot1+0\cdot1 & 1\cdot3+0\cdot1 \end{pmatrix}$

$= \begin{pmatrix} 0 & 1 & 1 \\ 0 & 1 & 3 \end{pmatrix}$

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Black: Original Triangle

Green: S

Red: M

Purple: T