

11/11/2022

M2. Tarea

1. $A = [2, 1, 3]$

$B = [4, 3, 1]$

$C = [3, 2, 4]$

a) $Q =$ escalar A en X, Y, Z por un factor de 1.43 y trasladando usando B .

b) Rotar C 45° en eje X , tomar Q como pivote

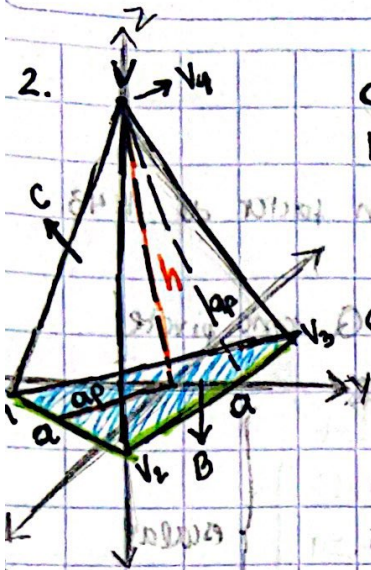
$$a) \begin{bmatrix} 1.43 & 0 & 0 & 0 \\ 0 & 1.43 & 0 & 0 \\ 0 & 0 & 1.43 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 2 \\ 1 \\ 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 2(1.43) \\ 1.43 \\ 3(1.43) \\ 1 \end{bmatrix} = \begin{bmatrix} 2.86 \\ 1.43 \\ 4.29 \\ 1 \end{bmatrix} \left\{ \text{escalar} \right.$$

$$\text{trasladar} \left\{ Q = \begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 2.86 \\ 1.43 \\ 4.29 \\ 1 \end{bmatrix} = \begin{bmatrix} 2.86 + 4 \\ 1.43 + 3 \\ 4.29 + 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 6.86 \\ 4.43 \\ 5.29 \\ 1 \end{bmatrix} \right.$$

$$b) \begin{bmatrix} 1 & 0 & 0 & -6.86 \\ 0 & 1 & 0 & -4.43 \\ 0 & 0 & 1 & -5.29 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 3 \\ 2 \\ 4 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 - 6.86 \\ 2 - 4.43 \\ 4 - 5.29 \\ 1 \end{bmatrix} = \begin{bmatrix} -3.86 \\ -2.43 \\ -1.29 \\ 1 \end{bmatrix} \left\{ T^{-1} \right.$$

$$\text{e en } 45^\circ \left\{ \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(45) & -\sin(45) & 0 \\ 0 & \sin(45) & \cos(45) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -3.86 \\ -2.43 \\ -1.29 \\ 1 \end{bmatrix} = \begin{bmatrix} -3.86 \\ -2.43(\cos(45)) + 1.29(\sin(45)) \\ -2.43(\sin(45)) - 1.29(\cos(45)) \\ 1 \end{bmatrix} = \begin{bmatrix} -3.86 \\ -0.806 \\ -2.63 \\ 1 \end{bmatrix} \right.$$

$$T \left\{ \begin{bmatrix} 1 & 0 & 0 & -6.86 \\ 0 & 1 & 0 & 4.43 \\ 0 & 0 & 1 & 5.29 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -3.86 \\ -0.806 \\ -2.63 \\ 1 \end{bmatrix} = \begin{bmatrix} -3.86 + 6.86 \\ -0.806 + 4.43 \\ -2.63 + 5.29 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 3.62 \\ 2.66 \\ 1 \end{bmatrix} = C \right.$$

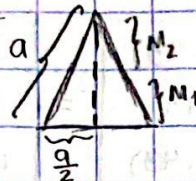


$a = 3.3$

$h = a \sqrt{\frac{2}{3}} = 3.3 \sqrt{\frac{2}{3}}$

$C = (-1.812, -6.824, 5.247)$

a) encontrar vértices



$c^2 = a^2 + b^2 \rightarrow (3.3)^2 = \frac{(3.3)^2}{4} + b^2$

$b = \sqrt{(3.3)^2 - \frac{(3.3)^2}{4}} = \sqrt{10.89 - 2.7225} = \sqrt{8.1675}$
 $h_b = 2.86$

$M_1 = \frac{1}{3} (2.86) = 0.95$

$M_2 = \frac{2}{3} (2.86) = 1.91$

$V_1 = (-1.812, -6.824, (5.247 + 1.91)) = (-1.812, -6.824, 7.157)$

$V_2 = (-1.812 - 3.3, -6.824, (5.247 - 0.95)) = (-3.462, -6.824, 4.297)$

$V_3 = (-1.812 + \frac{3.3}{2}, -6.824, (5.247 - 0.95)) = (-0.162, -6.824, 4.297)$

$V_4 = (-1.812, -6.824 + 3.3 \sqrt{\frac{2}{3}}, 5.247) = (-1.812, -4.13, 5.247)$

b) posición de vértices cuando se rota en Y por -15° , usando el centroide como el pivote

centroide = promedio de cada componente de cada vértice

$$= \left(\frac{x_{v1} + x_{v2} + x_{v3} + x_{v4}}{4}, \frac{y_{v1} + y_{v2} + y_{v3} + y_{v4}}{4}, \frac{z_{v1} + z_{v2} + z_{v3} + z_{v4}}{4} \right)$$

$$= \left(\frac{2(-1.812) - 3.462 - 0.162}{4}, \frac{3(-6.824) - 4.13}{4}, \frac{2(4.297) + 7.157 + 5.247}{4} \right)$$

centroide = $(-1.82, -6.151, 5.247)$

$$V_1 \begin{bmatrix} 1 & 0 & 0 & 1.822 \\ 0 & 1 & 0 & 6.151 \\ 0 & 0 & 1 & 5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -1.82 \\ -6.824 \\ 7.157 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.82 + 1.82 \\ -6.824 + 6.151 \\ 7.157 - 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ -0.673 \\ 1.91 \\ 1 \end{bmatrix} \quad T^{-1}$$

$$\begin{bmatrix} \cos(-15) & 0 & \sin(-15) & 0 \\ 0 & 1 & 0 & 0 \\ -\sin(-15) & 0 & \cos(-15) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 0 \\ -0.673 \\ 1.91 \\ 1 \end{bmatrix} = \begin{bmatrix} 1.91 \sin(-15) \\ -0.673 \\ 1.91 \cos(-15) \\ 1 \end{bmatrix} = \begin{bmatrix} -0.49 \\ -0.673 \\ 1.845 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} 1.91 \sin(-15) \\ -0.673 \\ 1.91 \cos(-15) \\ 1 \end{bmatrix}} \right\} \begin{array}{l} R \text{ en } -15^\circ \\ \text{en } y \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & -1.812 \\ 0 & 1 & 0 & -6.151 \\ 0 & 0 & 1 & 5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -0.49 \\ -0.673 \\ 1.845 \\ 1 \end{bmatrix} = \begin{bmatrix} -0.49 - 1.812 \\ -0.673 - 6.151 \\ 1.845 + 5.247 \\ 1 \end{bmatrix} \quad V_1 = \begin{bmatrix} -2.302 \\ -6.824 \\ 1.092 \\ 1 \end{bmatrix}$$

$$V_2 \quad \begin{bmatrix} 1 & 0 & 0 & 1.812 \\ 0 & 1 & 0 & 6.151 \\ 0 & 0 & 1 & -5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -3.462 \\ -6.824 \\ 4.297 \\ 1 \end{bmatrix} = \begin{bmatrix} -3.462 + 1.812 \\ -6.824 + 6.151 \\ 4.297 - 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.65 \\ -0.673 \\ -0.95 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} -3.462 \\ -6.824 \\ 4.297 \\ 1 \end{bmatrix}} \right\} T^{-1}$$

$$\begin{bmatrix} \cos(-15) & 0 & \sin(-15) & 0 \\ 0 & 1 & 0 & 0 \\ -\sin(-15) & 0 & \cos(-15) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -1.65 \\ -0.673 \\ -0.95 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.65 \cos(-15) - 0.95 \sin(-15) \\ -0.673 \\ 1.65 \sin(-15) - 0.95 \cos(-15) \\ 1 \end{bmatrix} = \begin{bmatrix} -1.348 \\ -0.673 \\ -1.345 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} -1.65 \cos(-15) - 0.95 \sin(-15) \\ -0.673 \\ 1.65 \sin(-15) - 0.95 \cos(-15) \\ 1 \end{bmatrix}} \right\} \begin{array}{l} R \text{ en } -15^\circ \\ \text{en } y \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & -1.812 \\ 0 & 1 & 0 & -6.151 \\ 0 & 0 & 1 & 5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -1.348 \\ -0.673 \\ -1.345 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.348 - 1.812 \\ -0.673 - 6.151 \\ -1.345 + 5.247 \\ 1 \end{bmatrix} \quad V_2 = \begin{bmatrix} -3.16 \\ -6.824 \\ 3.902 \\ 1 \end{bmatrix}$$

$$V_3 \quad \begin{bmatrix} 1 & 0 & 0 & 1.812 \\ 0 & 1 & 0 & 6.151 \\ 0 & 0 & 1 & -5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -0.162 \\ -6.824 \\ 4.297 \\ 1 \end{bmatrix} = \begin{bmatrix} -0.162 + 1.812 \\ -6.824 + 6.151 \\ 4.297 - 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} 1.65 \\ -0.673 \\ -0.95 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} -0.162 \\ -6.824 \\ 4.297 \\ 1 \end{bmatrix}} \right\} T^{-1}$$

$$\begin{bmatrix} \cos(-15) & 0 & \sin(-15) & 0 \\ 0 & 1 & 0 & 0 \\ -\sin(-15) & 0 & \cos(-15) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1.65 \\ -0.673 \\ -0.95 \\ 1 \end{bmatrix} = \begin{bmatrix} 1.65\cos(-15) - 0.95\sin(-15) \\ -0.673 \\ -1.65\sin(-15) - 0.95\cos(-15) \\ 1 \end{bmatrix} = \begin{bmatrix} 1.84 \\ -0.673 \\ -0.49 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} 1.65 \\ -0.673 \\ -0.95 \\ 1 \end{bmatrix}} \right\} \begin{array}{l} L \text{ en } 15^\circ \\ \text{en } y \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & -1.812 \\ 0 & 1 & 0 & -6.151 \\ 0 & 0 & 1 & 5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -1.812 \\ -0.673 \\ 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} 1.84 - 1.812 \\ -0.673 - 6.151 \\ -0.49 + 5.247 \\ 1 \end{bmatrix} \quad V_3 = \begin{bmatrix} 0.028 \\ -6.824 \\ 4.757 \\ 1 \end{bmatrix}$$

$$V_4 \begin{bmatrix} 1 & 0 & 0 & 1.812 \\ 0 & 1 & 0 & 6.151 \\ 0 & 0 & 1 & -5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} -1.812 \\ -4.13 \\ 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.812 + 1.812 \\ -4.13 + 6.151 \\ 5.247 - 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 2.021 \\ 0 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} -1.812 \\ -4.13 \\ 5.247 \\ 1 \end{bmatrix}} \right\} T^{-1}$$

$$\begin{bmatrix} \cos(-15) & 0 & \sin(-15) & 0 \\ 0 & 1 & 0 & 0 \\ -\sin(-15) & 0 & \cos(-15) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 0 \\ 2.021 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 2.021 \\ 0 \\ 1 \end{bmatrix} \left. \vphantom{\begin{bmatrix} 0 \\ 2.021 \\ 0 \\ 1 \end{bmatrix}} \right\} \begin{array}{l} L \text{ en } 15^\circ \\ \text{en } y \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & -1.812 \\ 0 & 1 & 0 & -6.151 \\ 0 & 0 & 1 & 5.247 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 0.028 \\ 2.021 \\ 5.247 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.812 \\ 2.021 - 6.151 \\ 5.247 \\ 1 \end{bmatrix} \quad V_4 = \begin{bmatrix} -1.812 \\ -4.13 \\ 5.247 \\ 1 \end{bmatrix}$$