



Daffodil
International
University

Discussion

Course Title: Computer Graphics

Course Code: CSE 421

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Question: The vertices of an object is $A(12, 5, 9)$, $B(15, 13, 8)$, $C(18, 14, 17)$ and $D(10, 15, 17)$. Find the transformed object after 55° rotation in y-axis and when $s_k x = -3$ and $s_k z = -2$

Y-axis rotation:

$$\begin{aligned} x' &= x \cos \theta + z \sin \theta \\ y' &= y \\ z' &= z \cos \theta - x \sin \theta \end{aligned}$$

Here, $\theta = 55^\circ$

$$\begin{aligned} A' &= (12 \cos 55^\circ + 9 \sin 55^\circ, 5, 9 \cos 55^\circ - 12 \sin 55^\circ) \\ &= (14.25, 5, -4.66) \approx (14, 5, -5) \end{aligned}$$

$$\begin{aligned} B' &= (15 \cos 55^\circ + 8 \sin 55^\circ, 13, 8 \cos 55^\circ - 15 \sin 55^\circ) \\ &= (15.15, 13, -7.69) \approx (15, 13, -8) \end{aligned}$$

$$\begin{aligned} C' &= (18 \cos 55^\circ + 17 \sin 55^\circ, 14, 17 \cos 55^\circ - 18 \sin 55^\circ) \\ &= (24.24, 14, -4.99) \approx (24, 14, -5) \end{aligned}$$

$$\begin{aligned} D' &= (10 \cos 55^\circ + 21 \sin 55^\circ, 15, 21 \cos 55^\circ - 10 \sin 55^\circ) \\ &= (22.93, 15, 3.85) \approx (23, 15, 4) \end{aligned}$$

Shearing for y-axis: $y' = y$; $x' = x + s_{xy} \cdot y$; $z' = z + s_{yz} \cdot y$

$$A'' = (12 + (-3) \cdot 5; 5; 9 + (-2) \cdot 5) = (-3, 5, -1)$$

$$B'' = (15 + (-3) \cdot 13; 13; 8 + (-2) \cdot 13) = (-24, 13, -18)$$

$$C'' = (18 + (-3) \cdot 14; 14; 17 + (-2) \cdot 14) = (-24, 14, -11)$$

$$D'' = (10 + (-3) \cdot 15; 15; 21 + (-2) \cdot 15) \\ = (-35, 15, -9)$$

Ans: —