

## 绕任意轴的旋转

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绕任意轴( $R_x, R_y, R_z$ )旋转的矩阵为:

$$\begin{bmatrix} \cos \theta + R_x^2 (1 - \cos \theta) & R_x R_y (1 - \cos \theta) - R_z \sin \theta & R_x R_z (1 - \cos \theta) + R_y \sin \theta & 0 \\ R_y R_x (1 - \cos \theta) + R_z \sin \theta & \cos \theta + R_y^2 (1 - \cos \theta) & R_y R_z (1 - \cos \theta) - R_x \sin \theta & 0 \\ R_z R_x (1 - \cos \theta) - R_y \sin \theta & R_z R_y (1 - \cos \theta) + R_x \sin \theta & \cos \theta + R_z^2 (1 - \cos \theta) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

OpenGL expects all the vertices, that we want to become visible, to be in normalized device coordinates after each vertex shader run.