Reference

Cosine Table:

Cos	Sin	Decimal	Fraction
cos(0°)	sin(90°)	1.0	2/2
cos(30°)	sin(60°)	0.866	√3/2
cos(45°)	sin(45°)	0.707	√2/2
cos(60°)	sin(30°)	0.5	1/2
cos(90°)	sin(0°)	0.0	0/2
cos(120°)	sin(-30°)	-0.5	-1/2
cos(135°)	sin(-45°)	-0.707	-√2/2
cos(150°)	sin(-60°)	-0.866	-√3/2

Homogeneous transformation matrices

Scaling by (s_x, s_y, s_z):

$$\begin{bmatrix} s_x & 0 & 0 & 0 \\ 0 & s_y & 0 & 0 \\ 0 & 0 & s_z & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Translation by (t_x, t_y, t_z):

$$\begin{bmatrix} 1 & 0 & 0 & t_x \\ 0 & 1 & 0 & t_y \\ 0 & 0 & 1 & t_z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Rotation α around the X axis:

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(\alpha) & -\sin(\alpha) & 0 \\ 0 & \sin(\alpha) & \cos(\alpha) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Rotation β around the Y axis:

$$\begin{bmatrix} \cos(\beta) & 0 & \sin(\beta) & 0 \\ 0 & 1 & 0 & 0 \\ -\sin(\beta) & 0 & \cos(\beta) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Rotation γ around the Z axis:

$$\begin{bmatrix} \cos(\gamma) & -\sin(\gamma) & 0 & 0 \\ \sin(\gamma) & \cos(\gamma) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Reference (Continued)

Euler Angle components correspond to the following axes of rotation:

Roll = X-axis, Pitch = Y-Axis, Yaw = Z-Axis

Quaternion rotation angle: $\theta = 2*\text{acos}(q_w)$

Quaternion normalization (component-wise):

$$|q| = \frac{q}{\sqrt{{q_x}^2 + {q_y}^2 + {q_z}^2 + {q_w}^2}}$$

Linear interpolation between points with values A and B given amount α:

$$C = \alpha * A + (1- \alpha) * B$$

Linear interpolation at point x between points at x_1 and x_2 with values y_1 and y_2:

$$y = \frac{y_2(x - x_1) + y_1(x_2 - x)}{x_2 - x_1}$$

GLSL swizzling supports the following (equivalently-ordered) letters:

`my_vec.xyzw, my_vec.rgba, my_vec.stpq`

Jellyfish References