

Rotating a square over another square without sliding

$$x_c := 0$$

$$y_c := 0$$

$$r := 5$$

$$x(t) := r \cdot \cos(t) + x_c$$

$$n := 4$$

$$i := 0..n$$

$$t_i := \frac{i \cdot 2 \cdot \pi}{n} + \frac{\pi}{4}$$

$$y(t) := r \cdot \sin(t) + y_c$$

$$z(t) := 0$$

$$P_{0,i} := x(t_i)$$

$$P_{1,i} := y(t_i)$$

$$P_{2,i} := z(t_i)$$

$$P_{3,i} := 1$$

$$Rz(\theta) := \begin{pmatrix} \cos(\theta) & -\sin(\theta) & 0 & 0 \\ \sin(\theta) & \cos(\theta) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T(j) := \begin{bmatrix} 1 & 0 & 0 & (P^{\langle j \rangle})_0 \\ 0 & 1 & 0 & (P^{\langle j \rangle})_1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad T1(j) := \begin{bmatrix} 1 & 0 & 0 & 2 \cdot (P^{\langle j \rangle})_0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$j := \text{trunc}\left(\frac{\text{FRAME}}{18}\right) = 0$$

$$\theta := \frac{\pi}{18} \cdot \text{FRAME}$$

Use **To:72** value for **FRAME** variable in animation window.

$$P = \begin{pmatrix} 3.54 & -3.54 & -3.54 & 3.54 & 3.54 \\ 3.54 & 3.54 & -3.54 & -3.54 & 3.54 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$Q := T(j) \cdot Rz(\theta) \cdot T(j)^{-1} \cdot T1(j) \cdot P$$

$$Q = \begin{pmatrix} 10.61 & 3.54 & 3.54 & 10.61 & 10.61 \\ 3.54 & 3.54 & -3.54 & -3.54 & 3.54 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

