Bicycle Project
\[ w \text{ for upper & lower legs} \]

Assume \( w \) is sinusoidal

\[ w_{\text{max}} - w \]

\[ \int w \, dt = \Delta \theta \]

\[ \Delta t \]

\[ t \]

\[ w = w_{\text{max}} \sin \Omega t \]

\( \Omega \) is frequency of above curve.

\[ P = 2 \Delta t = \frac{2\pi \text{ rad}}{\Omega \text{ rad/sec}} \]

\[ \Omega = \frac{\pi}{\Delta t} \text{ rad/sec} \]

\[ w = w_{\text{max}} \sin \frac{\pi}{\Delta t} t \]

\[ \theta = \int w \, dt = w_{\text{max}} \int \sin \frac{\pi}{\Delta t} t \, dt \]

\[ \Delta \theta = w_{\text{max}} \int_0^\pi \sin \frac{\pi}{\Delta t} t \, dt \]

\[ \Delta \theta = -w_{\text{max}} \frac{\Delta t}{\pi} \cos \frac{\pi}{\Delta t} t \bigg|_0^\pi \]
\[ \Delta \theta = \omega_{max} \frac{\Delta t}{\pi}. \]

\[ \omega_{max} = \frac{\pi}{\Delta t} \Delta \theta = \frac{n \text{ rad}}{n \text{ sec}} \]

\[ \alpha = \omega_{max} \Omega \cos \Omega t \]

\[ \alpha_{max} = \omega_{max} \frac{\pi}{\Delta t} \]

Since \( M = J \cdot \alpha \) could use this result to get \( M_{max} \) on upper & lower legs. \( M \) applied by muscles at knee and hip to make joints rotate.