Problem 2 (4 points)
A mouse of mass $m$ runs in an exercise wheel of mass $M$ and radius $R$. The mouse runs at constant speed $v$ relative to the wheel. The wheel has a damping torque proportional to its angular velocity given by:

$$|\tau_{\text{damp}}| = k|\omega|$$

\[ \begin{array}{c}
\text{(a) (1 point) If the mouse is not moving relative to the lab, what is the angular velocity $\omega$ of the wheel in terms of $m$, $M$, $R$, $v$, and $k$?} \\
\text{(b) (2 points) What is the angle of the mouse, $\theta$?} \\
\text{(c) (1 point) How much power is the mouse delivering?}
\end{array} \]