Problem 3

A ladder is propped up against a wall as shown below. If the base of the ladder is sliding out at a speed of 2 m/s, what is the speed of the top of the ladder?

\[ X_B = s \sin \theta \]

\[ y_B = y_A - s \cos \theta = 0 \]

\[ y_A = 4 \quad \Rightarrow \quad \theta = 36.87^\circ \]

\[ X_B = s \cos(\theta) \dot{\theta} = 2 \text{ m/s} \quad \Rightarrow \quad \dot{\theta} = \frac{2}{s} \text{ rad/s} \]

\[ \dot{y}_B = \dot{y}_A + s \sin(\theta) \dot{\theta} = 0 \]

\[ \dot{y}_A = -s \sin(\theta) \dot{\theta} = \sqrt{38.87^\circ} \]

\[ \dot{y}_A = -1.5 \text{ m/s} \]