ME 274 – Wagner – Quiz 02   Name_____Solution_____
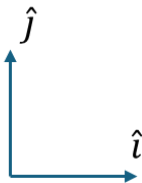
You may work in groups.   You may use your book. You may not use the internet.

The end B of the link AB moves to the right with a constant speed v_B. What is the angular velocity vector of link AB. Answer symbolically in terms of at most: L, θ, and v_B.   Be sure to draw your unit vectors.

$\hat{j}$

(1 point: Show unit vectors)

$\hat{i}$

A

L

$\vec{v}_A = \vec{v}_B + \omega \times \vec{r}_{A/B}$

(2 points: Rigid body velocity equation. Note if you switch A & B in this expression the position vector direction also changes)

θ B v_B

$\vec{r}_{A/B} = -Lcos(\theta)\hat{i} + Lsin(\theta)\hat{j}$

(1 point: Correct position vector for chosen form of velocity equation)

$v_A\hat{j} = v_B\,\hat{i} + \omega\hat{k} \times [-Lcos(\theta)\hat{i} + Lsin(\theta)\hat{j}]$

$\hat{i}$: $0 = v_B - \omega Lsin(\theta)$

$\boxed{\vec{\omega} = \dfrac{v_B}{Lsin(\theta)}\hat{k}}$ (2 points: correct answer in vector form)