Quiz 09: Chapter 16

Due: Tuesday 27 Feb 2024

Examine the solved problem below. There are four errors in the solution below. Your task is to locate and identify those errors, then correct them and calculate the proper result. If the same error occurs more than once, only count it as a single error, even if you have to correct it in more than one instance.

Each correctly identified error is worth 4 points, and the re-calculated results are worth 4 points as well. You must save your work in pdf format and submit via the Quiz 09 Assignment in the Chapter 16 folder of the in the Quizzes folder in the Online Classroom in Blackboard. Please do not use any other file format than pdf.

The rod assembly is supported by ball-and-socket joints at *A* and *B*. At the instant shown it is rotating about the *y*-axis with angular velocity $\omega = 8\frac{\text{rad}}{\text{s}}$ and has an angular acceleration $\alpha = 5\frac{\text{rad}}{\text{s}^2}$. Determine the velocity and the acceleration vectors of point *C* at this instant.

- A) Calculate the vector velocity $\overrightarrow{v_c}$:
 - $\overrightarrow{v_c} = \overrightarrow{r} \times \overrightarrow{\omega} = \begin{bmatrix} 0.4m & 0.4m & 0.3m \end{bmatrix} \times \begin{bmatrix} 0 & 8\frac{\text{rad}}{\text{s}} & 0 \end{bmatrix}$ $\overrightarrow{v_c} = \begin{bmatrix} 3.2 & 0 & -2.4 \end{bmatrix} \frac{\text{m}}{\text{s}}$
- B) Calculate the acceleration velocity $\overrightarrow{a_c}$:

$$\overrightarrow{a_c} = \vec{\alpha} \times \vec{r} + \vec{\omega} \times (\vec{r} \times \vec{\omega}) \overrightarrow{a_c} = \begin{bmatrix} 0 & 5\frac{\text{rad}}{s^2} & 0 \end{bmatrix} \times \begin{bmatrix} 0.4\text{m} & 0.4\text{m} & 0.3\text{m} \end{bmatrix} + \begin{bmatrix} 0 & 8\frac{\text{rad}}{s} & 0 \end{bmatrix} \times \begin{bmatrix} 3.2 & 0 & -2.4 \end{bmatrix} \frac{\text{m}}{s} \overrightarrow{a_c} = \begin{bmatrix} 1.5 & 0 & -2 \end{bmatrix} \frac{\text{m}}{s^2} + \begin{bmatrix} -19.2 & 0 & -25.6 \end{bmatrix} \frac{\text{m}}{s^2}$$

