No

Date

(5.6)

a.) $\vec{r} = \hat{i}(x_0 + R\cos\Omega t) + \hat{j} R \sin\Omega t$

$\vec{\dot{r}} = -\hat{i}\,\Omega R \sin\Omega t + \hat{j}\,\Omega R \cos\Omega t$

$\vec{\dot{r}} \cdot \vec{\dot{r}} = v^2 = \Omega^2 R^2$

$v = \Omega R$

b.) $\vec{\ddot{r}} = \vec{\dot{r}} = -\vec{\omega} \times \vec{r}$ ketika $\vec{r} = \hat{i}x' + \hat{j}y'$

$= -\hat{i}\,\Omega R \sin\Omega t + \hat{j}\,\Omega R \cos\Omega t - \omega\hat{k} \times (\hat{i}x' + \hat{j}y')$

$= -\hat{i}\,\Omega R \sin\Omega t + \hat{j}\,\Omega R \cos\Omega t - \hat{j}\,\omega x' + \hat{i}\,\omega y'$

$\dot{x}' = \omega y' - \Omega R \sin\Omega t$

$\dot{y}' = -\omega x' + \Omega R \cos\Omega t$

c.) $u' = x' + iy'$, $i = \sqrt{-1}$!

$\dot{u}' = \dot{x}' + i\dot{y}' = \omega y' - \Omega R \sin\Omega t - i\omega x' + i\Omega R \cos\Omega t$

$i\omega u' = -\omega y' + i\omega x'$

$\Rightarrow \dot{u}' + i\omega u' = -\Omega R \sin\Omega t + i\Omega R \cos\Omega t = i\Omega R e^{i\Omega t}$

$u' = Ae^{-i\omega t} + Be^{i\Omega t}$

$\dot{u}' = -i\omega A e^{-i\omega t} + i\Omega B e^{i\Omega t}$

$i\omega u' = i\omega A e^{-i\omega t} + i\omega B e^{i\omega t}$

$\Rightarrow \dot{u} + i\omega u' = i(\omega + \Omega) B e^{i\omega t}$, maka $B = \frac{\Omega R}{\omega + \Omega}$

$u' = A + B = x'(0) + iy(0) = x_0 + R$

$\Rightarrow A = x_0 + R - B$

$= x_0 + R - \frac{\Omega R}{\omega + \Omega}$, maka $A = x_0 + \frac{\omega R}{\omega + \Omega}$

$$u' = \left[x_0 + \frac{\omega R}{\omega + \Omega}\right] e^{-i\omega t} + \frac{\Omega R}{\omega + \Omega} e^{i\omega t}$$

5.7

a.) $\overset{s}{n}(t) = Ra \cos\omega at$

$Ra \sin\omega at$

$\overset{s}{e}(t) = Re \cos\omega et$

$Re \sin\omega et$

$\frac{e}{a} = \frac{s}{a} \cdot \frac{s}{e}$

$\overset{e}{a}(t) = Ra \cos\omega at - Re \cos\omega et$

$Ra \sin\omega at - Re \sin\omega et$

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$r^{0e} = r^{s}a - r^{s}e$

$r^{e}_{a}(t) = \begin{bmatrix} Ra \cos \omega at - Re \cos \omega et \\ Ra \sin \omega at - Re \cos \omega et \end{bmatrix}$

b.) $V^{e}a\ (t) = \frac{d}{dt} ra^{2}\ (t)$

$\begin{bmatrix} -\omega a\ Ra \sin \omega at + \omega e\ Re \sin \omega et \\ \omega a\ Ra \cos \omega at - \omega e\ Re \cos \omega et \end{bmatrix}$

$t = 0$

$V^{e}a\ (t) = 0 \begin{bmatrix} 0 \\ \omega a Ra - \omega e Re \end{bmatrix}$

c.) $a^{e}a\ (t) = \frac{d}{dt} Va^{e}\ (t)$

$= \begin{bmatrix} -\omega a^{2} Ra \cos \omega at + \omega e^{2} Re \sin \omega et \\ -\omega a^{2} Ra \sin \omega at + \omega e^{2} Re \cos \omega et \end{bmatrix}$