

# Homework 2

ASE 366L

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CJL3282

$$1) \quad 1.1) \quad \varepsilon = -\frac{1}{2} \frac{\mu}{h^2} (1-e^2) \quad a = -\frac{\mu}{2\varepsilon}$$

$$a = 3.9584 \text{ DU}$$

$$1.2) \quad r_p = a(1-e) = 3.56854 \text{ DU} = r_p$$

$$1.3) \quad r_a = a(1+e) = 4.34825 \text{ DU} = r_a$$

$$1.4) \quad \mu = \frac{h^2}{\mu} = 3.92 \text{ DU} = \mu$$

$$1.5) \quad i = \cos^{-1} \left( \frac{h_z}{|h|} \right) = 45^\circ = i$$

$$1.6) \quad \hat{n} = \frac{\hat{k} \times \hat{h}}{|\hat{k} \times \hat{h}|} = \hat{j}$$

$$1.7) \quad \Omega = \cos^{-1} (\hat{n}_i) = 90^\circ = \Omega$$

$$1.8) \quad \omega = \cos^{-1} \left( \frac{e \cdot \hat{n}}{e} \right) = 120.51^\circ = \omega$$

$$2) \quad 2.1) \quad a = 4.82843 \text{ DU} \quad e = 0.61537$$

$$i = 54.736^\circ \quad \Omega = 45^\circ$$

$$\omega = 275.66^\circ \quad U = 84.343^\circ$$

$$2.2) \quad a = 24 \text{ DU} \quad e = 0.875$$

$$i = 90^\circ \quad \Omega = 108.44^\circ$$

$$\omega = 50^\circ \quad U = 0^\circ$$

$$3) \quad 3.1) \quad a = 2 \quad e = 0.5 \quad i = 90^\circ \quad \omega = 90^\circ \quad \Omega = 270^\circ$$

$$r = [0, 1.5, 0] \text{ DU} \quad U = 90^\circ$$

$$v = [0, 0.4083, -0.8165] \text{ DU/TA}$$

$$3.2) \quad a = 2 \quad e = 0 \quad i = 90^\circ \quad \Omega = 270^\circ \quad U = 50^\circ$$

$$r = [0, 0, 2] \text{ DU} \quad v = [0, 0.707, 0] \text{ DU/TA}$$

4.

$a = 1.797232379204074$  radians

$e = 0.999977659702704$

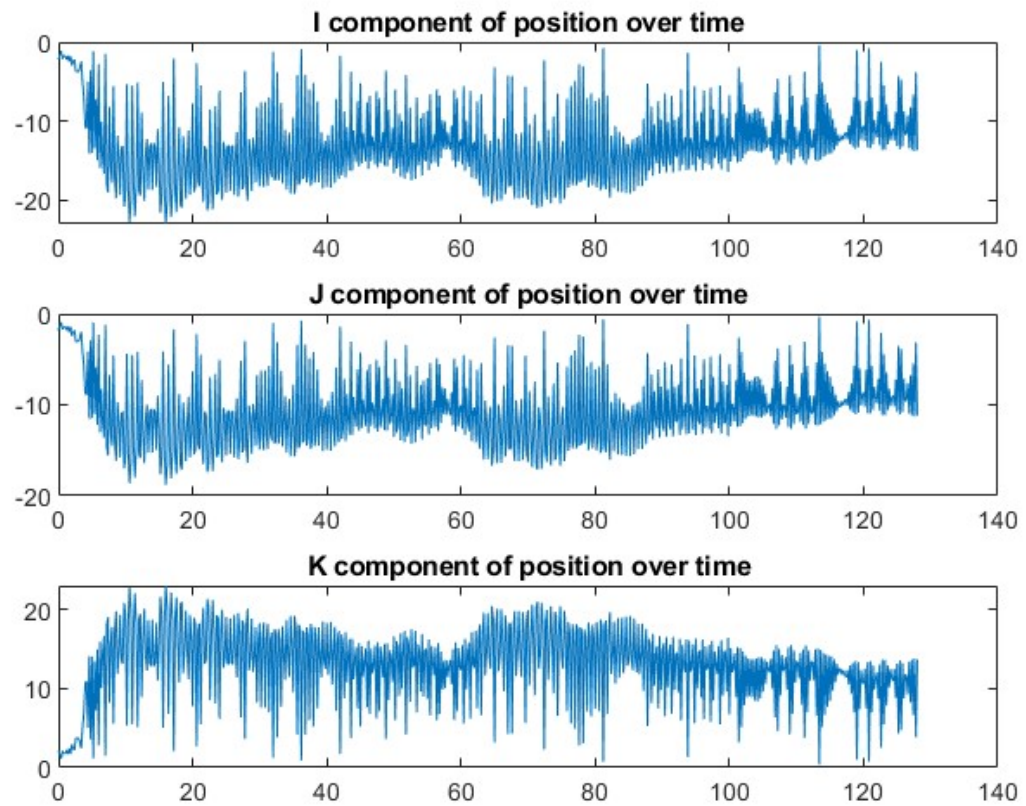
$i = 0.785398163397448$

$\Omega = 2.1269$  radians

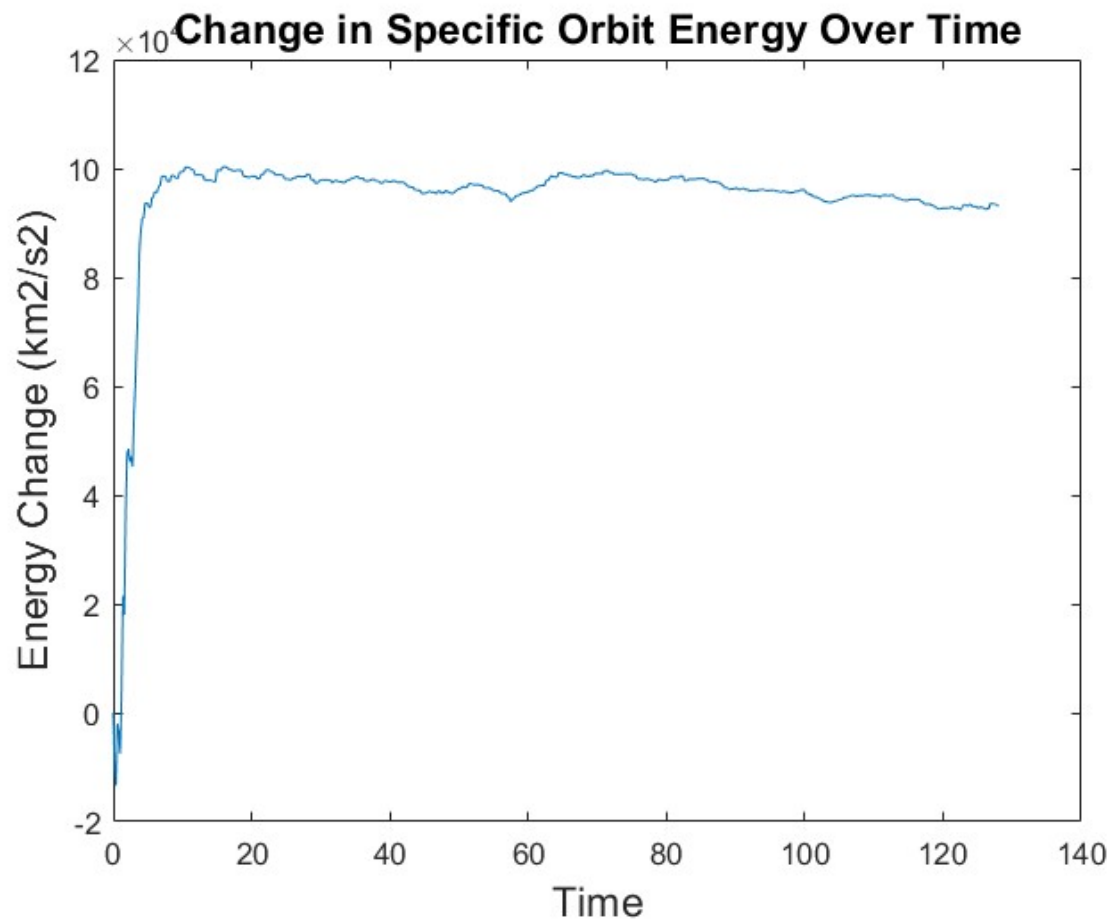
$\omega = 5.5580$  radians

$\nu = 3.1416$  radians

5 .Had challenges propagating past 641 iterations, so I stopped there.



6. The general growth over time was expected.



7. The results generally match what was expected, however there must have been some error in the code that resulted in the I and Omega components flatlining.

