Class 3

Swihart ch 2

#2 $q = 20$ $\quad T = 20^{3/2} = 89.4$ years but just half = 44.7 years

#3 $q = T^{2/3} = (75.7)^{2/3} = 17.9$ AU

$q(1-e) = \text{peri} = .587$ AU

$$1 - \frac{.587}{q} = e = .967$$

#6 $h = rv\sin\theta = (1.6)(1.2)\sin 60° = 1.663 \ \frac{AU^2}{\text{year}} = \sqrt{GMa(1-e^2)}$

$$\frac{1}{2}v^2 - \frac{GM}{r} = -\frac{GM}{2q}$$

$$\frac{1}{r} - \frac{1}{2}\frac{v^2}{GM} = \frac{1}{2q}$$

$$q = \frac{1}{2\left(\frac{1}{r} - \frac{1}{2}\frac{v^2}{GM}\right)} = \frac{1}{2\left(\frac{1}{1.6} - \frac{1}{2}\left(\frac{1.2}{2\pi}\right)^2\right)}$$

(GM = $(2\pi)^2$)

$$= .824 \text{ AU}$$

$$\frac{h^2}{GMq} = 1 - e^2 \ ; \quad e = \sqrt{1 - \frac{h^2}{GMa}} = \sqrt{1 - \left(\frac{1.663}{2\pi}\right)^2 \frac{1}{.824}}$$

(GM = $(2\pi)^2$)

$$= .957$$

$$\frac{q(1-e^2)}{1+e\cos\phi} = r$$

$$\frac{q(1-e^2)}{r} = 1 + e\cos\phi$$

$$\frac{1}{e}\left[\frac{q(1-e^2)}{r} - 1\right] = \cos\phi = \frac{1}{.957}\left[\frac{.824(1-.957^2)}{1.6} - 1\right] = -.9996$$

$\downarrow$

$178.5°$

all sig figs → 178.486