2) $\vec{r} = (7000\hat{i} - 2000\hat{j} - 4000\hat{k})\ km$

$\vec{v} = (3\hat{i} - 6\hat{j} + 5\hat{k})\ \frac{km}{s}$

$r = \sqrt{(7000)^2 + (-2000)^2 + (-4000)^2}\ km = 8306,62\ km$

$v = \sqrt{(3)^2 + (-6)^2 + (5)^2} = \sqrt{70}\ \frac{km}{s} = 8,37\ \frac{km}{s}$

Teniendo $\mu = 398600,4418 \frac{km^3}{s^2}$ constante.

$$\vec{e} = \frac{\left(v^2 - \frac{\mu}{r}\right)\vec{r} - (\vec{r}\cdot\vec{v})\vec{v}}{\mu}$$

$$\vec{e} = \frac{\left[\left(8,37\frac{km}{s}\right)^2 - \frac{\mu}{8306,62km}\right]\vec{r} - (\vec{r}\cdot\vec{v})\vec{v}}{\mu}$$

$$\vec{e} = \frac{\left(70,057\frac{km^2}{s^2} - 47,986\frac{km^2}{s^2}\right)\vec{r} - (\vec{r}\cdot\vec{v})\vec{v}}{\mu}$$

$$\vec{e} = \frac{\left(22,071\frac{km^2}{s^2}\right)\vec{r} - (\vec{r}\cdot\vec{v})\vec{v}}{\mu}$$

$$\vec{e} = \frac{(154497; -44142; -88284) - (39000; -78000; 65000)}{\mu}$$

$$\vec{e} = \frac{115497\hat{i} + 33858\hat{j} - 153284\hat{k}}{398600,4418} = 0,29\hat{i} + 0,085\hat{j} - 0,38\hat{k}$$

$$e = \sqrt{(0,29)^2 + (0,085)^2 + (-0,385)^2} = 0,489$$

$e = 0,489 \rightarrow$ (a)

* Para calcular la anomalía verdadera

$$\cos(\nu) = \frac{\vec{e}\cdot\vec{r}}{e\cdot r} \rightarrow \nu = \cos^{-1}\left(\frac{\vec{e}\cdot\vec{r}}{er}\right)$$

$$\nu = \cos^{-1}\left[\frac{(0,29; 0,085; -0,385)(7000; -2000; -4000)}{0,489 \cdot 8306,62}\right]$$

$\nu = 33,17 \rightarrow$ (b)