Question:

In fact, there is such a star (a-Centauri) except that its companion isn't a planet, but another Sun-like star. Does this fact make any difference in the forgoing calculation? Explain.

Solution:

If you «replace» the planet with the star in the above scenario, you will need to change your calculation. Speci_cally, a second star signi_cantly increases the mass of the system from $1M_{\odot}$ to $2M_{\odot}$.

The equation is:

$$3\alpha = p2M$$

takes as its input the total mass of the system. If you increase the total mass of the system from $1M_{\odot}$ to $2M_{\odot}$, the separation between the two objects is larger by a factor of $2^{\frac{1}{3}}$. This, in turn, means that the system is more distant by a factor of $2^{\frac{1}{3}}$.