Physics 108 Homework 7

1. Since we know 1 AU is represented by 26 yd, first convert the distance to Proxima Centauri to AU

$$1\ AU = 1.496 \times 10^{11}\ m$$
$$1\ pc = 3.086 \times 10^{16}\ m \qquad (4\ sig\ figs)$$

So

$$1.3\ pc \times \frac{3.086 \times 10^{16}\ m}{1\ pc} \times \frac{1\ AU}{1.496 \times 10^{11}\ m} = 268,168\ AU$$

Then convert this to a distance in the Peppercorn model

+5

$$268168\ AU \times \frac{26\ yd}{1\ AU} \times \frac{3\ ft}{1\ yd} \times \frac{1\ mile}{5280\ ft} = 3962\ miles$$
$$\simeq 4000\ miles$$

2a) The speed of light is $c = 2.9979 \times 10^8\ m/s$

A day is $24\ hr \times \frac{60\ min}{hr} \times \frac{60\ sec}{min} = 86400\ seconds$

+5

$$1\ light\ day = 86400\ s \times 2.9979 \times 10^8\ m/s$$
$$= 2.59 \times 10^{13}\ m \simeq 2.6 \times 10^{13}\ m$$

2b)

+5 $1 \text{ light day} = 2.6 \times 10^{13} \text{ m} \times \frac{1 \text{ AU}}{1.496 \times 10^{11} \text{ m}} = 174 \text{ AU}$

3) If we can determine the period of the orbit and the size of the orbit (distances of each from the center of mass tells us that) +5 then we can use Kepler's 3rd law to determine the masses of the stars

4) The solar nebula is the cloud from which the solar system evolved. It was there before the star formed.

+5 A planetary nebula is a cloud of gas blown off a star at the end of its life. It is there after the star has run out of fuel.

+3 5. a) Mickey Mouse

+3 b) Another bowling ball.
They are close to the same size.

+3 c) The Pistol Star

+5 6. a) Retrograde began around Jan 29, 2012

+5 b) Retrograde will end around April 19, 2012

44