

# PHAS1102 – Physics of the Universe

25<sup>th</sup> October 2011

Practice Problem sheet 3 – solutions will be posted w/c 31 Oct

You may adopt:

$$M_{\odot} = 2 \times 10^{30} \text{ kg}; L_{\odot} = 4 \times 10^{26} \text{ W}$$

1. By considering the combined flux, determine the combined apparent magnitude of a binary star system consisting of two stars of apparent magnitudes 3.0 and 4.0?
2. Sirius A has a luminosity 23.5 times that of the Sun and burns H into He. How many kg of H does Sirius A burn into He each second? If Sirius A has 2.3 times the mass of the Sun and 10% of its mass converts from H to He, calculate the lifetime of Sirius A and compare it to that of the Sun.
3. The maximum in the spectrum of a white dwarf and in that of a red giant star occurs at 30 nm and 1500 nm, respectively. If their corresponding radii are  $10^6$  and  $10^{11}$  m, determine the stars' temperatures and the ratio of their luminosities.