ASTR 121 – Worksheet #1
2/11/2005
For full credit, show all of your work.

1. Calculate the temperatures of the following stars if their peak emission occurs at: a) λ= 1000 nm, b) λ= 1200 nm, c) λ= 550 nm, d) λ= 75 nm.

2 Calculate the luminosity of the above stars, in terms of L_{sun}, if they have the following radii: a)$400R_{sun}$, b) $0.7R_{sun}$, c) $0.96R_{sun}$, d) $4R_{sun}$

3. Now calculate the mass of each star, in terms of M_{sun}.

4. For how long will each star live?

5. Draw an H-R Diagram; label each axis, as well as the spectral classes of stars, and draw/mark where the Main Sequence, White Dwarfs, Red Giants, and Blue Giants lie.

6. On your H-R diagram, plot each of the four stars from above; approximately what spectral class is each?

7. Draw the evolution of a low mass star on your H-R diagram, list the different phases it transitions through along the way. What will our Sun be when it "dies"?

8. Use the distance modulus to calculate the distance to a star whose apparent magnitude, m, is 20, and absolute magnitude, M, is 17.5.

9. Calculate the colors of the following stars, is each bluer or redder than Vega? a) m_B=22.31, m_V =17.6, b) m_B=16.89, m_V =16.94, c) m_B=19.2, m_V =21.53

10. Calculate the total energy released over the lifetime of a star that is completely mixed (i.e. H at the surface can flow to the core, unlike in our Sun), if it has a mass of $0.3M_{sun}$.

Bonus Question:
Derive the distance modulus.