Porblemas Unidad 1

Pols → Exercises: 5.1

Calculate λ_{max} for the Sun.

Demonstrate the distance modulus equation

Knowing that the apparent visual magnitude of the Sun is − 26.73, calculate its absolute magnitude.

A binary star system is observed, and since the separation between the two stars is much smaller that the distance of the system from the observer, it can be supposed that both stars are found at the same distance from Earth. The absolute magnitude in a given photometric band of the first star is determined to be − 0.5, while its apparent magnitude is 3.5. If the apparent magnitude of the second star is 4.5, what is its absolute magnitude? At what distance (in light - years) is the binary system from the observer?

What is the numerical difference between the absolute magnitudes of two stars having the same T_{eff} , where one of these stars is in the giant phase and has a radius 15 times larger than the other star, which finds itself on the main sequence?

Consider a basketball with a radius of 12 cm. It was just used in a game, and as a result it heated up to human body temperature, 98.6 F. The ball is placed in a locker room at 68 F. Assume the basketball is a perfect blackbody.
(a) Calculate the basketball's luminosity.
(b) A blackbody also receives heat from its environment, following the same equation used to calculate blackbody emission. At what rate does the basketball absorb heat from its environment? What is the net rate of energy loss?
(c) What is the peak wavelength of the basketball's blackbody emission? In which part of the electromagnetic spectrum does this fall?
(d) Given your answer to part (c), why is the basketball orange?