

HMWK #5

ASTR 250

	<u>Spectral TYPE</u>	<u>T order</u>	<u>L order</u>	<u>R order</u> ← ^{Problem 5}
(2.) Sun	G2V	2	4	4
Sirius	A1V	1	3	3
Betelgeuse	M2 Iab	4	1	1
Aldebaran	K5 III	3	2	2
Barnard's Star	M4Ve	5	5	5

(3.) $L \sim M^{3.5} \Rightarrow M \sim L^{1/3.5}$

$M = (2)^{1/3.5} = 1.22 M_{\odot}$

$M = (0.5)^{1/3.5} = 0.82 M_{\odot}$ P-P chain

(4.) $R_s = \frac{2GM_{\odot}}{c^2} = \frac{2 (6.67 \times 10^{-8} \text{ cm}^3 \cdot \text{s}^{-2} \cdot \text{g}^{-1}) (2 \times 10^{33} \text{ g})}{(3 \times 10^{10} \text{ cm/s})^2} = 3.0 \times 10^5 \text{ cm} \approx 3 \text{ km!}$

(5.) $L = 4\pi R^2 \sigma T^4$

$\log L = \log(4\pi R^2 \sigma T^4) = \log(4\pi\sigma) + \log R^2 + \log T^4$

$\log L = \log(4\pi\sigma) + 2\log R + \underline{4\log T}$ ← slope of $\log L - \log T$ plot.

If $R = \text{const}$, then $\log(4\pi\sigma) + 2\log R = \text{const}$.

But, in H-R diagram T is plotted increasing to the left

So the slope = -4. See above for order.