

## Homework Assignment 4 (due 12 noon, Fri Oct 7<sup>th</sup>)

This assignment is composed of the following questions from Chapters 4, 5 and 6 of *An Introduction to Modern Stellar Astrophysics*, augmented with a supplementary question:

- Show that the relativistic Doppler shift for purely radial motion with  $v_r \ll c$  gives  $z \equiv \frac{\Delta\lambda}{\lambda_{\text{rest}}} \approx \frac{v_r}{c}$ . Show that this approximation is still good for non-radial motion if the transverse velocity  $v_t \approx v_r$ .  
**HINT:** Use the first-order Taylor series expressions  $\sqrt{1 \pm x} \approx 1 \pm \frac{x}{2}$  and  $(1 \pm x)^{-1} \approx 1 \mp x$  for  $x \ll 1$ .
- Q4.8
- Q5.1
- Q5.2
- Q5.11
- Q6.2
- Q6.8
- Q6.15