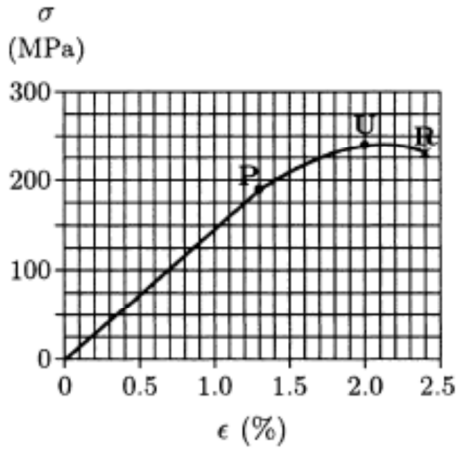
Physics 216 HW 2: Ch 14&16 To hand in due beginning of class 1/26/2018.

To receive full credit:

- **clearly show your reasoning** (including any necessary calculations),
- **indicate your final answer in an unambiguous way** (such as by circling or underlining it).
- **round your answers appropriately**

1. Below is a stress-strain curve for the type of bone found in the femur. The elastic region ends at point P. The femur is typically about 45 cm long and 2.8 cm in diameter at its thinnest.
    a. Find the elastic modulus of the bone.



    b. Between point P and point U, does the bone become more or less stiff? Explain briefly how you know.
    c. Calculate how much the length of the typical femur changes if it bears half the weight of a typical person.

2. For the numerical values of the parameters in Exercise and Problem #14 in Ch 16, write down the full expression for the wave (e.g. D(x,t))
3. An alien on a planet around the star Alpha Centauri is lonely and broadcasts a radio signal of 100,000 Watts uniformly in all directions to try to find some friends.
    a) What is the maximum power from this signal that would be incident on the FAST radio telescope which has a 500m diameter collecting dish? (cite any reference used for the distance to Alpha Centauri).
    b) If the telescope can detect a signal as small at 10^{-26} W/m^2, would we get the invitations?
4. Astronomers often use the Doppler shift of light (or radio waves) from stars to learn about its motion. One of the largest Doppler shifts of nearby stars is that of Barnard's star with $\frac{\Delta f}{f} = 4.0 \times 10^{-7}$.
    a) What is the speed of Barnard's start along our line of sight?
    b) Given that the Doppler shift for Barnard's star is positive (toward higher frequencies), what can we conclude about which direction (towards us or away from us) it is moving? Explain.