When writing up your solutions, keep in mind the problem documentation requirements (Slide 6 of the Lecture 1 presentation).

Turn in your homework (typeset, printed, and stapled, with your name, student number, and section) by 12:00 PM on the due date. Homework collection boxes will be in either Prof. Reed’s office or on the shelf in the lounge area near the faculty offices.

1. (10 points) Text problem 7.5.


3. (10 points) Text problem 7.15.

4. (10 points) Writing one equation, determine the number of Poles in one Ramsden Chain, using this information (all of these are actual units):

   1 Gunther Chain = 4.00 Poles
   To find the number of Lignes, multiply the number of Ramsden Chains by 13512
   Pouces x 12.0 = Lignes
   Pieds = Toises x 6.00
   Multiply the number of Pieds by 12.0 to obtain Pouces
   To find the number of Poles, divide the number of Toises by 2.58

5. (20 points) The cubit is an archaic measure of length mentioned several times in the Old Testament of the Bible, defined as the length of the forearm as measured from the elbow to the ends of the fingers.

   During the construction of an Egyptian pyramid, one particular stone was moved 20 cubits in a single working day (12 hours). Assuming a cubit is 20 in, determine the average speed of the stone in (a) smoots per helek, and (b) furlongs per fortnight.

6. (20 points) A vegetable market in China sells apples for 1.2 RMB per jin and oranges for 2.7 RMB per kilogram. In Mexico, apples are 20% more expensive, and oranges are 15% less expensive. If you were to buy 3 lb of apples and 2 jin of oranges in Mexico, how much would you have to pay in Mexican pesos? (Use the website xe.com for currency conversion rates.)

7. (20 points) Consider a 100 W light bulb that emits light in all directions equally.

   (a) What is the power density of the light, in W/m², at a distance of 4.0 m?

   (b) In 2 minutes, how much energy is absorbed by a square panel, 20 cm x 20 cm, placed 2.2 m from the bulb? (Hint: power is energy per unit time.)
**Preparation for Next Week**

Read the Wikipedia article on dimensional analysis:

https://en.wikipedia.org/wiki/Dimensional_analysis

(You can skip the section “Mathematical examples”.)

Read this webpage about scaling laws:

http://www.av8n.com/physics/scaling.htm