Physics CS 31 **Fall 2010**

Set #1 - for Wd Sept. 29

Read HR&K Chapter 1 - particularly Section 1.7
Chapter 2 - Sections 2.1 through 2.3
Appendix H: Vectors (2D and 3D)
Read K&K Chapter 1 - Sections 1.1 through 1.4

From Resnick, Halliday & Krane, Vol. 1 (5th Edition):

Ch. 1 Exercises 32, 33.
Ch. 2 Exercise 10, Problems 1, 2, 3.

1. Indicate the properties of two vectors $\vec{a}$ and $\vec{b}$ such that
a) $\vec{a}+\vec{b}=\vec{c}$ and $a+b=c$ (note: $|\vec{a}|=a$)
b) $\vec{a}+\vec{b}=\vec{a}-\vec{b}$
c) $\vec{a}+\vec{b}=\vec{c}$ and $a^2+b^2=c^2$

2. A tourist flies from Washington D.C. to Manila. The latitude and longitude of the two cities are 39^o N, 77^o W and 15^o N, 121^o E respectively. The radius of the earth is 6370 Km.
a) Describe the displacement vector.
b) What is its magnitude?

3. Let N be an integer greater than 1. Consider the sum of N vectors of equal length, each vector making an angle of $2\pi/N$ with that preceding. Then show:

$$\cos 0+\cos\frac{2\pi}{N}+\cos\frac{4\pi}{N}+.....+\cos(N-1)\frac{2\pi}{N}=0$$

that is, $\sum_{n=0}^{N-1}\cos\frac{2\pi n}{N}=0$

Also show: $\sum_{n=0}^{N-1}\sin\frac{2\pi n}{N}=0$

4. You have 200 ft of steel sheet 0.020 in thick and you want to wrap it around a 6.00 in diameter tubing. How many turns of steel will you get? Neglect any air gap effects.