1. Photon with frequency $\omega$ is scattered by electron moving with momentum $\mathbf{p}$. The angle $\theta$ between direction of the photon and electron momentum is $\theta$. After the scattering the direction of the photon is at angle $\theta'$ with respect to $\mathbf{p}$. Find the photon frequency after the scattering.

2. Atoms moves in a media with refraction coefficient $n(\omega)$. (In such media the phase velocity of light becomes $c' = c/n(\omega)$). Same atom at rest emits radiation at frequency $\omega_0$. What frequency will be observed in the conditions of the problem?

3. The electron beam of radius $R$ and carrying current $I$ was accelerated by potential $V$. Find increase in the radius of the beam over length $L$. 

Homework (2) 3
Due February 12th 2007.