Problem 1. Show that the magnetic field $B$ on the axis of a circular solenoid of length $L$ and radius $a$, carrying a right-handed current $I$, is

$$B_z = \frac{\mu_0 n I}{2 \left( \frac{1}{\sqrt{1 + (a/x)^2}} + \frac{1}{\sqrt{1 + [a/(L-x)]^2}} \right)}$$

where $x$ is the distance on the axis from the bottom of the solenoid (entry point of the current), and $n >> 1$ is the number of turns per unit length.

Problem 2. A spherical conducting shell of radius $a$ and surface charge $\sigma$ rotates with constant angular velocity $\omega = (0, 0, \omega)$. Compute the magnetic field $B$ inside and outside the spherical shell.

Problem 3. Jackson problem 5.15 parts (a) and (b).