Problem 1
Find the force of attraction between two magnetic dipoles, $\mathbf{m}_1$ and $\mathbf{m}_2$, oriented as shown in Figure 1, a distance $d$ apart, using
(a) equation (6.2) of Griffiths.
(b) equation (6.3) of Griffiths.

Problem 2
A uniform current density $\mathbf{J} = J_0 \hat{k}$ fills a slab straddling the $yz$ plane, from $x = -a$ to $x = +a$. A magnetic dipole $\mathbf{m} = m_0 \hat{i}$ is situated at the origin.

a) Find the force on the dipole using equation (6.3) of Griffiths.
b) Do the same for a dipole pointing in the $y$-direction: $\mathbf{m} = m_0 \hat{j}$.

Problem 3
A long circular cylinder of radius $R$ carries a magnetization $\mathbf{M} = kr^2 \hat{\phi}$, where $k$ is a constant, $r$ is the distance from the axis, and $\hat{\phi}$ is the azimuthal unit vector. Find the magnetic field due to $\mathbf{M}$ for points inside and outside the cylinder.

Problem 4
A short circular cylinder of radius $R$ and length $L$ carries a "frozen-in" uniform magnetization $\mathbf{M}$ parallel to its axis. Find the bound current, and sketch the magnetic field of the cylinder. (Make two sketches: one for $L \gg R$, and one for $L \ll R$.)
Problem 5

Of the following materials, which would you expect to be paramagnetic and which diamagnetic? Aluminum, copper, copper chloride (CuCl₂), carbon, lead, nitrogen (N₂), salt (NaCl), sodium, water.