Lesson #37: Bound Currents **Name:** _____

Study section 6.2 and example 6.1. Then answer the following questions.

1. Explain how bound surface currents are created in a magnetized material.

2. Explain how bound volume currents are created in a magnetized material.

3. In example 6.1, the bound currents are found for a uniformly magnetized sphere. Suppose the magnetization of the sphere is changed to $\vec{M}(\vec{r}) = kz\hat{z}$ where k is a constant. Calculate the bound currents (surface and volume) for this new case:

   $\vec{K}_b =$

   $\vec{J}_b =$

4. Suppose the magnetization of the sphere is again changed, to $\vec{M}(\vec{r}) = ks\hat{z}$, where k is a constant and s is (as usual) the perpendicular distance from the z axis. Calculate the bound currents (surface and volume) for this new case:

   $\vec{K}_b =$

   $\vec{J}_b =$

5. Does it make sense to you that the bound volume current for question 3 is zero, while for question 4 it is nonzero? Explain. (I'm looking for a physical explanation here, not a mathematical one.)