Name _____ Course/Section _____

Date _____ Professor/TA _____

Activity 6.1 What makes a cell a living organism?

1. Single-celled organisms and individual cells within multicellular organisms can vary greatly in appearance as well as in the functions they perform. Nonetheless, each of these cells is alive and therefore must have some common characteristics.

a. At a minimum, what structures or components must a cell contain to be alive?	b. What is the function of each structure or component listed in part a?

c. If you consider the types of single-celled organisms that exist today, which, if any, have a structure similar to your description in part a?

2. What would you need to add to or change about the cell you described in question 1 to make it:

a. A eukaryotic animal cell?	b. A eukaryotic plant cell?

3. To get an idea of the different sizes of various cellular components, do the following calculations: Assume that the cell, its nucleus, and a globular protein—for example, an enzyme—are spherical. In addition, assume the diameter of the protein is 5 nm, the diameter of the cell is 100 μm (micrometers), and the diameter of the nucleus is 40 μm.

If you draw the globular protein as a sphere with a diameter of 2 cm (approximately the diameter of a U.S. penny), what size would each of the following measurements of the cell be if drawn to the same scale (5 nm real length = 2 cm)?	
a. The radius of a microtubule (Refer to Table 6.1, page 113, in *Biology,* 7th ed.)	
b. The diameter of the nucleus	
c. The diameter of the cell	
d. The volume ($V = 4/3\ \pi r^3$) of the protein	
e. The volume of the nucleus	
f. The volume of the cell	

g. Do the results of these calculations help you to understand how so much can be going on inside a cell at once? Explain.