For a better understanding of disease and ubiquitousness of pathogenic microbes, the public needs a better education of the power of exponential growth used by microorganisms in their replication. The recent pandemic has laid bare how poorly our public is educated about scientific information and the way science advances. The study below uses data on some small microbes for you to appreciate their optimal strategy of rapid reproduction and its implications for disease.

This study begins by examining the size of several microbes, having you compute volumes and surface areas. **WeBWorK** adds a little variation to your individual problems, making most unique. (Not a group project this time!) These physiological characteristics are important to the evolution of these microorganisms. The study continues by adding dynamics to the problem, using the basic continuous Malthusian ODE model,

$$\frac{dP}{dt} = kP, \qquad \text{with IC} \quad P(0) = P_0. \tag{1}$$

You examine different growths for different microbes to better understand the power of exponential growth. The last problem is an extreme case to open your eyes to what Malthusian growth really means.

e. (5 pts) This part has you create a graph of two different growing microbes and has you write a brief discussion about what you observe in their growths. Your graph needs to be computer generated, preferably in MatLab, including a title and appropriately labeled axes.

g. (2 pts) This part has you write a brief discussion about what you learned from the Michael Crichton example.