M331 Introduction to Mathematical Modeling
Test I

Closed book, closed neighbor. September 18, 2000

1. Draw a marginal cost curve which intersects with a marginal revenue curve in two places. You may assume the marginal revenue curve is a constant and the marginal cost curve has the shape of a parabola.

   - interpet the qualitative shape of these marginal curves.
   - what is the significance of the points of intersection?

2. Consider again our model for the baseball industry. Assume that the supply curve is steep and the demand curve is flat. In the event of a strike, who pays more, the fans or the owners? Justify your answer with the appropriate well-labelled graph.

3. Consider the annuity which is modeled (exactly) by the difference equation

   $$a_{n+1} = 1.01a_n - 1000$$

   Explain the nature of the annuity. Compute the amount left in the account after 100 months for the cases

   - $a_0 = \$100,000.01$
   - $a_0 = \$99,999.99$

4. Suppose there are 400 students in a college dorm and that one or more students has a serious case of the flu. Assume some interaction between those infected and not infected is required to pass on the disease. If all are susceptible to the disease, provide a model in the form of a difference equation for the spread of the disease. What predictions can you make from your model?