First Modeling Problem

Due: Wednesday, February 3, 2:00 pm.

The same farmer whose pig was the source of all the consternation in the opening example of our book is unsatisfied with the answer provided by the textbook authors. Your task is to do a better job. In particular, you must explain to the farmer how the answer to the question of “when to sell the pig” depends on a number of factors, including market rates, weight gains, and perhaps other things. Write a report for the farmer explaining the issues. Your work should include:

- sensitivity analysis
- clear graphics
- clear statement of modeling assumptions
- a clear document structure

The best analyses will move beyond a purely linear model structure and consider price and growth functions along the lines of what is proposed in section 3.1 of the text. Specifically, they might consider a price function of the form

\[ p(t) = 0.65e^{-(0.01/0.65)t}, \]

as proposed in the book in Exercise 1 on page 100, or a weight function of the form

\[ w(t) = \frac{800}{1 + 3e^{-t/30}}, \]

as proposed in Exercise 2 on page 101. Note that to solve the model with these sorts of functions, you’ll need to use numerical methods of the sort discussed in Lab 1.

The farmer is mathematically inclined, and thus is happy to read appropriate mathematical details, but is a busy man, so your report should cut to the chase.