1 Introduction

You are responsible for managing a tract of timberland. The volume of any given tree is:

\[ Q(t) = \exp(a - b/t) \]  

where \( a \) and \( b \) are known parameters and \( t \) is the age of the tree (i.e. the number of years since it was planted). Price is \( p \) per unit volume, replanting cost is \( c \) per tree, and the discount rate is \( r \).

2 Specify the Problem

Your objective is to maximize the net present value of the tract of land over an infinite horizon. Specify this as a discrete time dynamic programming problem. What are the state and control variables?

3 Solve the Problem Numerically

Use the following parameters:

- \( a = 12.96, b = 196.11 \)
- \( p = $0.10, c = 100, r = .05 \)

Write a MATLAB program to solve this problem. What is the “solution?”

4 Climate Change

Now suppose that climate change alters the growing conditions so parameter, \( b \), increases to \( b = 210.0 \). If you don’t adapt (i.e. you don’t change your policy), what is the cost of climate change? How would you optimally adapt? With adaptation, what is the cost of climate change? What is the value of adaptation?