Exercise 1:

Using estimates of rainfall, evaporation, and water consumption, the town engineer developed the following model of the water volume in the reservoir as a function of time

$$V(t) = 10^9 + 10^8 (1 - e^{-t/100}) - rt$$

where V is the water volume in liters, t is time in days, and r is the town's consumption rate in liters per day. Write two user-de ned functions. The rst function should de ne the function V(t) for use with the fzero function. The second function should use fzero to compute how long it will take for the water volume to decrease to x percent of its initial value of 10^9 L. The inputs to the second function should be x and r. Test your functions for the case where x = 50 percent and $r = 10^7$ L/day.

Exercise 2:

The volume V and paper surface area A of a conical paper cup are given by

$$V = \frac{1}{3}\pi r^2 h \qquad A = \pi r \sqrt{r^2 + h^2}$$

where r is the radius of the base of the cone and h is the height of the cone.

- a. By eliminating h, obtain the expression for A as a function of r and V.
- b. Create a user-de ned function that accepts R as the only argument and computes A for a given value of V. Declare V to be global within the function.
- c. For V = 10 in.³, use the function with the fminbnd function to compute the value of r that minimizes the area A. What is the corresponding value of the height h? Investigate the sensitivity of the solution by plotting V versus r. How much can R vary about its optimal value before the area increases 10 percent above its minimum value?