Homework
due on Friday, October 7

Read Chapter 2 of the book. Solve problem 2.2.32 and the following problems.

Problem 1. Two rivers run parallel 2 miles appart. Two cities A and B lie between the rivers; each city is equidistant from the rivers and the cities are 3 miles appart. A scientist wishes to travel from A to B, collecting a sample of water from each river during his journey. What is the length of the shortest path he can follow. Justify your answer.

Problem 2. Is there a positive integer k such that both $4k + 1$ and $9k + 1$ are suqares?

Problem 3. Let $f(x) = \dfrac{1}{1 - x}$. Denote by f^r the composition of f with itself r times. For example, $f^2(x) = f(f(x))$ and $f^5(x) = f(f(f(f(f(x)))))$. Compute $f^{2011}(2011)$.

Problem 4. Let $x > -1$ be a real number different from 0. Prove using induction that if $n \geq 2$ is an integer then

$$(1 + x)^n > 1 + nx.$$