Homework Week 3

Exercise 1:

Create a list of the first 1000 Pell numbers, defined by

$$p_n = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ 2p_{n-1} + p_{n-2} & \text{if } n > 1 \end{cases}$$

Then calculate the relative difference between $\sqrt{2}$ and $\rho = \dfrac{p_{1000} + p_{999}}{p_{1000}}$, that is $\dfrac{|\sqrt{2} - \rho|}{\sqrt{2}}$.

Exercise 2:

Find all Pythagorean triples (a, b, c) where a, b, c are numbers between 1 and 200. Pythagorean triple means that $a^2 + b^2 = c^2$. In addition, impose the condition that $a \leq b$. Hint: A triple loop is not very effective, but works.

Exercise 3:

You are given a file containing words. Write a program that returns a dictionary that counts the occurrence of words.

Exercise 4:

Create a program that takes a file (like alice.txt) and applies the Caesar cipher with a rotation of 13 to it. Show how another application of the Caesar cipher decodes the file.