1. Design an algorithm for computing the $n^{\text{th}}$ power of a $k \times k$ matrix such that the running time of the algorithm is in $O(k^3 \cdot \log_2 n)$. Show with careful analysis that the running time of your algorithm is in $O(k^3 \cdot \log_2 n)$.

Write a program that uses your algorithm and the identity in Exercises 2.5, 7 on page 84 to compute $f(n)$. Your program should read in the value for $n$, and print out $f(n)$ by computing $A^n$ where $A$ is given by

$$A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$$

2. Exercises 3.1, 4 a, b. page 102.


4. Exercises 3.1, 9, a, b, c. page 102.

5. Exercises 3.1, 10, page 102. Explain your answer. answer.