Reading Questions 11

page 162 Definition 5.2.1

page 163 Definition 5.2.2

page 164 Definition 5.2.3

1. The sequence $-17, -12, -7, -1, 3, \ldots$ is an arithmetic sequence.
2. The sequence $2, 6, 18, 54, \ldots$ is a geometric sequence.
3. The first term in the Fibonacci sequence is 0.
4. Is the sequence $1, 1, 1, \ldots$ an arithmetic sequence or geometric sequence or both?

Section 5.2 Recursively Defined Sequences (Part 1)

Recurrence Relation

P 1. Write out the first 6 terms of the sequence $f : \mathbb{N} \to \mathbb{Z}$ such that $f : a \mapsto 3a$.

P 2. Is the equation $a_k = 2$ where $k \geq 1$ a recurrence relation? If so, write out the sequence and the $5th$ term of the sequence.

P 3. What is the solution to the recurrence relation $a_{k+1} = 3a_k$ where $k \geq 0$ and $a_0 = 1$.

P 4. Let $a_1 = 1$ and $a_n = 2a_{n-1} + 1$ for $n \geq 2$. Write out the first 6 terms. Conjecture a solution for the recurrence relation.

P 5. Let $a_1 = 1, a_2 = 3$ and $a_n = 2a_{n-1} - a_{n-2}$ for $n \geq 3$. Write out the first 6 terms. Conjecture a solution for the recurrence relation.

Strong Principle of Mathematical Induction

P 6. Let $a_1 = 1, a_2 = 3$ and $a_n = 2a_{n-1} - a_{n-2}$ for $n \geq 3$. Conjecture a solution for the recurrence relation and prove it using Strong Mathematical Induction.

P 7. Let $a_0 = 1$, $a_1 = 4$, and $a_n = 4a_{n-1} - 4a_{n-2}$ for $n \geq 2$. Prove that $a_n = 2^n(n + 1)$ for all $n \geq 0$.

P 8. Prove ${}^\forall n \geq 12 \ {}^\exists s, t \in \mathbb{N} \cup \{0\}$ such that $n = 3s + 7t$.