Section 9.1: An Overview of Sequences and Series

Warm up:

For each of the following sequences, list the first four terms (start each with $n = 1$).

(a) $a_{n+1} = \dfrac{1}{2}\left(a_n + \dfrac{2}{a_n}\right)$, $a_1 = 1$.

(b) $a_n = \dfrac{1 \cdot 3 \cdot 5 \dots (2n-1)}{(2n)! \cdot 2n!}$, Recall that $n! = 1 \cdot 2 \cdot 3 \cdot 4 \dots (n-1) \cdot n$.

Group work:

Problem 1 *Give an explicit formula for each of the following sequences:*

(a) $\dfrac{2}{3}, \dfrac{-2}{7}, \dfrac{2}{11}, \dfrac{-2}{15}, \dots$

(b) $-2, 6, -24, 120, -720, \dots$

Problem 2 *For the sequence $a_k = (2-k)^k$*

(a) *calculate and list a_0, a_1, a_2, a_3, and a_4.*

(b) *Starting with $k = 0$, calculate and list $S_0 = \sum_{k=0}^{0} a_k$, $S_1 = \sum_{k=0}^{1} a_k$, $S_2 = \sum_{k=0}^{2} a_k$, $S_3 = \sum_{k=0}^{3} a_k$, and $S_4 = \sum_{k=0}^{4} a_k$. Write S_n in summation form and write S_∞ in summation form.*

Learning outcomes:

Problem 3 *Reindex the series*

$$\sum_{k=0}^{\infty} \frac{5}{(k+2)(k+1)}$$

in the form $\sum_{k=1}^{\infty} a_k$ *and* $\sum_{k=-4}^{\infty} c_k$.

Problem 4 *If* $\sum_{k=0}^{\infty} a_k = 6$ *and* $a_n = \frac{3}{2^n}$, *what is* $\sum_{k=4}^{\infty} a_k$*?*