

## 4 Sequences and Summation

### 4.1

For each of the following, state whether the sequence is arithmetic or geometric, and give the next 3 values in the sequence

1. 1, 7, 13
2. 0.9, 0.6, 0.4
3.  $2k$ ,  $6k$ ,  $18k$

### 4.2

Give the first 5 elements of the following sequences:

1.  $\{\frac{n^2}{n-1}\}_{n=1}^{\infty}$
2.  $\{i^3\}_{i=3}^{\infty}$
3.  $a_n = a_{n-1} + 3$  where  $a_1 = 22$
4.  $a_n = 14 \times 3^{n-1}$

### 4.3

A geometric sequence has 10 terms and a common ratio of  $\frac{1}{10}$  and it's final term is  $10^{-8}$ .

1. Is this sequence increasing, decreasing, monotonic, and/or bounded? (List all that apply)
2. Is -10 a lower bound for this sequence?
3. Is 1 an upper bound for this sequence?

### 4.4

Solve the following summations

1.  $\sum_{i=1}^5 2$
2.  $\sum_{i=4}^7 i$
3.  $\sum_{i=1}^3 2^i$
4.  $\sum A$  where  $A = \{n^2\}_{n=1}^7$

### 4.5

Solve the following products

1.  $\prod_{k=1}^3 (2k + 1)$
2.  $\prod_{k=7}^{17} 2$
3.  $\prod A$  where  $A = \{\frac{1}{k}\}_{k=1}^4$

### 4.6

Consider the sequence  $S = \{\frac{n}{n+1}\}_{n=1}^{\infty}$

1. Give a lower bound for this sequence that is also in this sequence.
2. What is a number that this sequence will approach, but never quite reach?
3. Is this sequence increasing, decreasing, monotonic, and/or bounded? (List all that apply)

### 4.7

Simplify the following summations

1.  $\sum_{i=1}^n c$
2.  $\sum_{i=1}^n (i + 2)$
3.  $\sum_{i=1}^n (i^2 + 3i)$
4.  $\sum_{i=1}^n \sum_{j=1}^i j$
5.  $\sum_{i=1}^n A_i$  where  $A_n = A_{n-1} + \frac{1}{2}$  and  $A_1 = \frac{1}{2}$