

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 1

Math 2000

FALL 2018

Due: Friday, September 21st, 2018 by 2:00pm. SHOW ALL WORK.

Note: You should complete the worksheets for Sections 1.1 and 2.1 before you work on this assignment.

1. Simplify each of the following expressions as much as possible.

(a) $\frac{i!}{(i+3)!}$

(b) $\frac{(4i)!}{(3i)!}$

(c) $\frac{7 \cdot 9 \cdot 11 \cdots (2i+5)}{1 \cdot 3 \cdot 5 \cdots (2i-1)}$

2. Write the first five terms of the sequence $\{a_i\}$ defined by the indicated general term.

(a) $a_i = (-1)^i \frac{i^2 + 1}{i^2 + i}$

(b) $a_i = \frac{1 \cdot 4 \cdot 7 \cdots (3i-2)}{i!}$

3. Write the next five terms (beginning with a_3) of the sequence $\{a_i\}$ defined by the recursion formula

$$a_{i+2} = \frac{a_i - 1}{a_{i+1} + 1}$$

given $a_1 = -3$ and $a_2 = 1$.

4. Find a non-recursive formula, indexed from $i = 1$, for the general term a_i of each of the following sequences (assuming that the pattern of the first few terms continues).

(a) $\{6, -24, 120, -720, 5040, \dots\}$

(b) $\left\{ \frac{1}{9}, \frac{2}{27}, \frac{4}{81}, \frac{8}{243}, \frac{16}{729}, \dots \right\}$

(c) $\left\{ 7, 3, \frac{17}{9}, \frac{11}{8}, \frac{27}{25}, \dots \right\}$

5. Find and sketch the domain of each of the following functions.

(a) $z = \frac{\sqrt{y-x^2}}{x^2-4}$

(b) $f(x, y) = \frac{y \ln(x)}{y^2 - x^2}$