8-1 Sequences and Series

Ex 1) Write the first 4 terms. Assume n begins with 1.

$a_n = 3 + (-1)^n$

$n=1 \Rightarrow a_1 = 3+(-1)^1 = 2$

$n=2 \Rightarrow a_2 = 3+(-1)^2 = 4$

$n=3 \Rightarrow a_3 = 3+(-1)^3 = 2$

$n=4 \Rightarrow a_4 = 3+(-1)^4 = 4$

Ex 2) Find the a_{25} term if $a_n = (-1)^n (3n-2)$

$a_{25} = (-1)^{25}[3(25)-2]$

$a_{25} = -1(75-2)$

$a_{25} = -73$

Ex 3) Write an expression for the apparent nth term. Assume n begins with 1. (Explicit formula)

A) 1, 4, 7, 10, 13, ...

n	1	2	3	4	5
a_n	1	4	7	10	13

×3 −2

$a_n = 3n - 2$

B) 2, 3, 4, 5, 6, ...

3 4 5 6 7

n	1	2	3	4	5
a_n	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{6}{7}$

$a_n = \frac{n+1}{n+2}$

Recursive Formulas: You need one or more of the first few terms. All other terms are defined using previous terms.

Ex 4) Find the first 5 terms if $a_1 = 28$ and $a_{k+1}=a_k - 4$.

$a_2 \Rightarrow k=1 \Rightarrow a_{1+1}=a_1-4=28-4=24=a_2$

$a_3 \Rightarrow k=2 \Rightarrow a_{2+1}=a_2-4=24-4=20=a_3$

$a_4=16$ $a_5=12$

Simplify Factorials

Ex 5) $\frac{12!}{4!8!} = \frac{12\cdot 11\cdot 10\cdot 9\cdot 8\cdot 7\cdot 6\cdot 5\cdot \ldots\cdot 1}{4\cdot 3\cdot 2\cdot 1\cdot 8\cdot 7\cdot 6\cdot 5\cdot \ldots\cdot 1} = \frac{12\cdot 11\cdot 10\cdot 9}{4\cdot 3\cdot 2\cdot 1} = 3\cdot 11\cdot 5\cdot 3 = 495$

Summation Notation:

$$\sum_{i=1}^{n} a_i = a_1 + a_2 + a_3 + \ldots + a_n$$

Find the sum.

Ex 6) $\sum_{i=1}^{4} 3i = 3(1)+3(2)+3(3)+3(4) = 30$

Ex 7) $\sum_{k=0}^{3} \frac{1}{k^2+1} = \frac{1}{0^2+1}+\frac{1}{1^2+1}+\frac{1}{2^2+1}+\frac{1}{3^2+1} = 1.8$

Ex 8) Use sigma notation to rewrite.
$\frac{1}{3(1)} + \frac{1}{3(2)} + \frac{1}{3(3)} + \ldots + \frac{1}{3(9)}$

$\sum_{k=1}^{9} \frac{1}{3k}$

Can use the calculator to find the sum:
Sum(seq(formula, x, lower limit, upper limit))

Sum—found under list-math-sum
Seq—found under list-ops-seq