

M120 Series and Sequence Project

Date due:

Objective: Sequence and Series Ownership

Sequences:

This section is only the individual terms of the sequence - NOT their sum.

- I. Enter each of the following sequences into your calculator as a function of x , where x only takes values of 1, 2, ... Use TABLE to evaluate the terms of the sequence for increasing values of n . Based upon the TABLE values determine if the sequence converges or diverges. If it converges, find its limit.

a) $a_n = \frac{n^2+3n-4}{2n^2+n-3}$ b) $a_n = \frac{\sqrt{n}}{\sqrt{n+1}}$ c) $a_n = 1 + (-1)^n$

d) $a_n = \frac{n^2-25}{n+5}$ e) $a_n = \frac{1+(-1)^n}{n}$ f) $a_n = \frac{n!}{n}$

- II. Find a formula for the n th term of the sequence. Then, based on your formula, decide whether the sequence converges or diverges.

a) $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots$ b) $\frac{2}{2}, \frac{4}{8}, \frac{6}{26}, \frac{8}{80}, \frac{10}{242}, \dots$ c) $\frac{3}{1}, \frac{5}{3}, \frac{7}{5}, \frac{9}{7}, \frac{11}{9}, \dots$

Series

This section deals with the SUM of the sequences.

Use the SERIES program on your calculator to estimate the infinite sum of the following series. Use your program to decide whether each series converges or diverges.

If it appears to converge, what is its sum?

Note: Be careful about the STARTING value of n . Sometimes it is 0 and sometimes 1. You may wish to make that a variable in your summation program, or go in and edit the program!

III.

a) $\sum_{n=0}^{\infty} \left(-\frac{1}{2}\right)^n$ b) $\sum_{n=0}^{\infty} \left(\frac{3}{2}\right)^n$ c) $\sum_{n=1}^{\infty} \frac{4}{3^n}$

d) $\sum_{n=1}^{\infty} \frac{1}{n}$ e) $\sum_{n=1}^{\infty} \frac{n!}{2n!+1}$ d) $\sum_{n=0}^{\infty} \frac{1}{n!}$

Drilling Costs A well drilling-company charges \$16 for drilling the first foot of a well, \$16.10 for drilling the second foot, \$16.20 for the third foot, and so on. Determine the cost of drilling a 100-foot well.

- Find a formula for the cost of the n th foot.
- Express the total cost using the summation \sum notation.
- Find the sum (i.e. the total cost of drilling a 100-foot well).