SEQUENCES IN CALCULUS

Teacher Note: The file with this activity has a place for students to record their answers. If you have the ability to collect the student work, students can write their answers on page #.3 for each problem. Otherwise, students can use the worksheet to record their answers.

The directions for graphing a sequence are given in the example. Students can follow those instructions to answer the questions on the last page of the worksheet.

Key Terms:

Sequence: an ordered list of numbers
Term: one value of the sequence
Term index: integer variable used to identify a specific term in the sequence

Convergence of a sequence – A sequence a_n converges if L, $L = \lim\limits_{n \to \infty} a_n$, is finite and diverges otherwise.

Objective: To evaluate the limit of a sequence graphically.

Directions: For each of the sequences find the limit by graphing the sequence on your TI-Nspire.
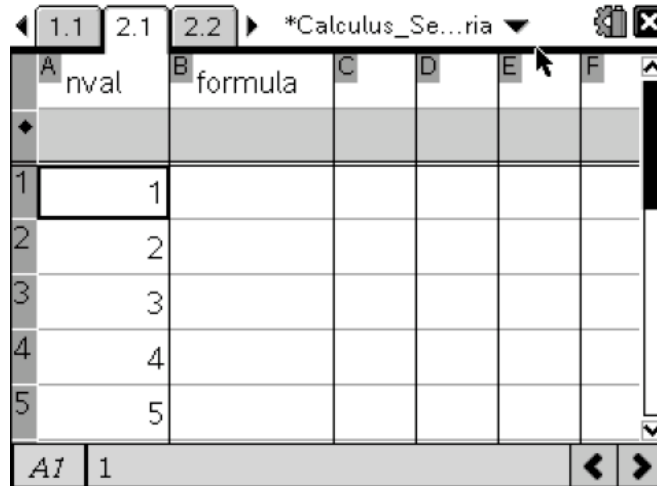

Example: Find the limit of $a_n = \dfrac{1}{2^n}$

Follow the steps below to evaluate the limit for the example problem.

1) Open the TI-Nspire file: Calculus_Sequences_Ilaria.

2) Go to page 2.1 for the first page of this activity. The first page is a spreadsheet with the values 1 to 10 filled in for the term index values of a sequence.
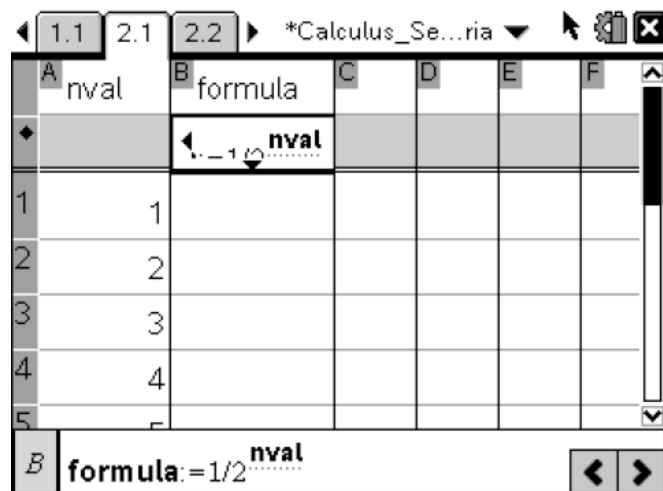
3) Type the formula for the sequence in the box under the formula column.

Note: *nval* is the variable used for the values in column A. Use *nval* to represent the *n* value in the sequence.

4) Press enter to fill in the formula column.

5) Use ctrl and right arrow to move to page 2.2 in order to graph the sequence

| 1.1 | 2.1 | 2.2 | ▶ | *Calculus_Se...ria ▼ |

```
5   y



1                                                    x

-1      1                                            10




       ⎰ x ←
  ⑳ s1 ⎱ y ←                                         ⧆
```
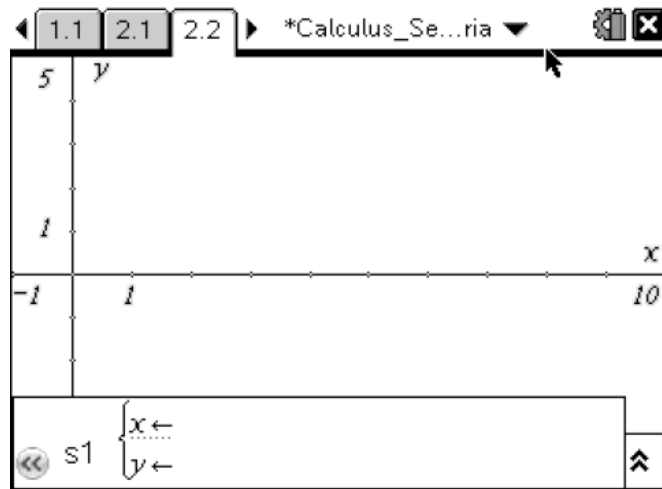
6)   Use ctrl and right arrow to move to page 2.3 in order to write your answer for this question.

| 2.2 | 2.3 | 3.1 | ▶ | *Calculus_Se...ria ▼ |

What is the limit of the sequence?|

Student types answer here

Suggested Response:

Type suggested response here (optional)

Note: If you teacher wants to record your answers on the TI-Nspire, then move to the answer field and delete the text to type your answer. Otherwise record your answers in the space provided on the next page.

Sequences in Calculus

Find the limit of the following sequences graphically using your TI-Nspire.

Note: The TI-NSpire file is set up for you to work on each question below in a different problem number on the calculator. If your teacher does not want to record your answers on your calculator, then you can reuse the same problem again to answer the questions below.

1) $a_n = \dfrac{2}{1-n^3}$

2) $a_n = \left(1+\dfrac{1}{n}\right)^n$

3) $a_n = 1-\dfrac{1}{n}$

4) $a_n = \dfrac{2-3n}{2+3n}$

5) $a_n = (-1)^n$

Record your answers below or on your TI-Nspire based on your teacher's instructions.

Example: _____

Problem 1) _____

Problem 2) _____

Problem 3) _____

Problem 4) _____

Problem 5) _____