MATH 202, Fall 2023

In class work 13

Name: _____

Row and Seat: _____

In class work **13** has questions **1** through **4** with a total of **10** points. Turn in your work at the end of class *on paper*. This assignment is due *Tuesday October 10 13:20.*

2   1. Use Desmos to graph $y = \sqrt{x^2 + 1} - x$. Reproduce the graph here. Based on the graph, what is your guess for the numeric value of $\lim\limits_{x \to \infty} \sqrt{x^2 + 1} - x$?

2   2. Show that the sequence whose formula is $a_k = \sqrt{k^2 + 1} - k$ converges. Show all of your work.

3. Determine if the sequence whose formula is $b_k = k \ln\left(1 + \frac{8}{k}\right)$ converges. If it does, find its limit. As always, show your work.

4. A sequence c is defined recursively by

$$c_n = \begin{cases} 2 & n = 0 \\ 5 & n = 1 \\ 5c_{n-1} - 6c_{n-2} & n = 2, 3, 4, \ldots \end{cases}$$

2   (a) Find the numeric values of c_2, c_3, and c_4.

2   (b) Show that $c_n = 2^n + 3^n$ is a solution to the equation $c_n = 5c_{n-1} - 6c_{n-2}$.