Math 1B Series Feb 26 2020

1. Let $a_n = \frac{3n-4}{n+6}$. Show a_n converges but $\sum_{n=1}^{\infty} a_n$ diverges.

2. Do these series converge or diverge? (If converges, what to?)

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

3. Find $\sum_{n=3}^{\infty} \frac{4}{n^2-2n}$ (Hint: use partial fractions to see is "telescoping")

4. Let $x = 0.123123\overline{123}$ (a repeated decimal). Use geometric series to write x as a ratio of two integers. (Warmup: do this process for $0.33\overline{3} = 1/3$.)

5. Let a_n be $\begin{cases} a_1 = 1 \\ a_n = \dfrac{2a_{n-1}+2}{a_{n-1}+2} & \text{if } n \geq 2 \end{cases}$. Can you show this converges? Maybe use numerical evidence to guess what to.

6. $\displaystyle\sum_{k=1}^{\infty} \frac{k}{2^k}$ (Challenge!)