

Math 1AA3/1ZB3: Week 4 Tutorial Problems

January 25, 2019

1. Determine whether the following series converge:

(a)

$$\sum_{n=1}^{\infty} \ln(2n) - \ln(1+n)$$

(b)

$$\sum_{n=3}^{\infty} \frac{\cos(\pi/n)}{n}$$

(c)

$$\sum_{n=1}^{\infty} \frac{n^3 + 2n + 1}{n^4 + 2n + 1}$$

(d)

$$\sum_{n=0}^{\infty} \frac{\sin^2 n}{n^2 + 1}$$

2. Estimate the value of the following series to within an error of 0.01:

$$\sum_{n=1}^{\infty} \frac{2}{n^3}$$

3. The population of wolves in a forest can be approximately modeled by the series:

$$S_t = \sum_{n=0}^t \left(\frac{100}{n+1} - \frac{100}{n+4} \right)$$

where t is measured in years.

- (a) What does the term a_n represent?
- (b) What does $\lim_{t \rightarrow \infty} S_t$ represent?
- (c) What is the initial wolf population?
- (d) What is the eventual wolf population after many years?
- (e) How many years does it take for the wolf population to stabilize?