

# Class 24: Introduction to Series

## Calculus II

College of the Atlantic. March 2, 2023

1. Write out the following sums:

$$\sum_{n=1}^4 2n . \quad (1)$$

$$\sum_{n=1}^6 7 . \quad (2)$$

$$\sum_{k=1}^4 2k . \quad (3)$$

$$\sum_{n=1}^3 nx^n . \quad (4)$$

$$2 \sum_{k=1}^4 k . \quad (5)$$

$$\sum_{n=1}^4 \frac{(-1)^{n+1} x^n}{n!} . \quad (6)$$

2. Write the following sums using  $\Sigma$  notation:

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots \quad (7)$$

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots \quad (8)$$

$$1 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \cdots \quad (9)$$

3. For each of the following series, do the following:

- (a) Use python to compute the following partial sums:  $S_{100}$ ,  $S_{1000}$ ,  $S_{10000}$ .
- (b) Does the series appear to be converging? If so, what is it converging to? You should see some familiar numbers appearing.

$$\sum_{n=0}^{\infty} 3 \left(\frac{1}{2}\right)^n . \quad (10)$$

$$S = \sum_{n=1}^{\infty} \frac{1}{n} . \quad (11)$$

$$S = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n} . \quad (12)$$

$$S = \sum_{n=1}^{\infty} \frac{6}{n^2} . \quad (13)$$

$$S = \sum_{n=0}^{\infty} \frac{1}{n!} . \quad (14)$$

$$S = \sum_{n=0}^{\infty} \frac{2^n}{n!} . \quad (15)$$