

Honors HW6 (due 27 March)

The important Euler-Mascheroni constant γ is defined by

$$\gamma \stackrel{\text{def}}{=} \lim_{n \rightarrow \infty} \left(\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} - \log(n) \right).$$

This number appears in many different places in mathematics and science. In this homework, you will approximate this number. Define the sequence

$$T_n = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} - \log(n).$$

1. It turns out that the sequence $a_n = \frac{1}{n}$ creates a divergent infinite sum (the “harmonic series”). Use a spreadsheet (or write a computer program) to find the first n for which $S_n > 5$.
2. Find the first n for which $S_n > 7$.
3. Compute T_n for $n = 1, 2, 3, 4, 5$, and 6.
4. Use a spreadsheet or a computer program to find T_{1000} .