

## Problem of the week #7

Due March 13th

**Problem.** Show, with proof, there exists a rearrangement  $m_1, m_2, m_3, \dots$  of the natural numbers  $1, 2, 3, \dots$ , a constant  $c < 1$ , and a bound  $N$  for which

$$\sum_{k=1}^n \frac{1}{m_k} < c \sum_{k=1}^n \frac{1}{k}$$

for all  $n \geq N$ .

*Note.* Defining the  $n$ th harmonic number  $H_n = 1 + \frac{1}{2} + \dots + \frac{1}{n}$ , you may use the fact that  $0 < H_n - \ln n < 1$  for all  $n > 1$ .

- Partial credit may be given for partial answers.
- Each POW will be due the following week at 1pm.
- Questions? Email: [bthorner@unomaha.edu](mailto:bthorner@unomaha.edu)
- Submit solutions to (above email), DSC 210, or DSC 203.
- POWs, solutions, backgrounds, leaderboard available at

<https://www.unomaha.edu/college-of-arts-and-sciences/mathematics/student-opportunities/pow.php>