



## Proof Without Words: Rearranged Alternating Harmonic Series

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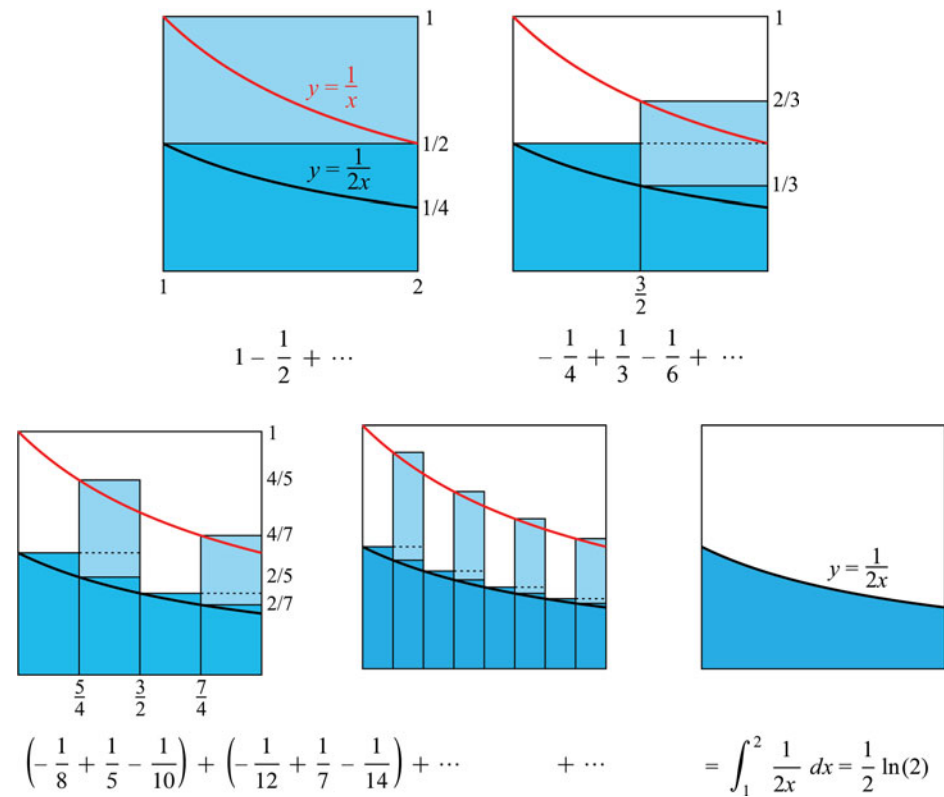
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# Proof Without Words: Rearranged Alternating Harmonic Series

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Lord Brouncker [1], and more recently Hudelson [2], visually demonstrate that the alternating harmonic series converges and has sum equal to  $\ln(2)$ . We modify their technique to demonstrate that

$$1 - \frac{1}{2} - \frac{1}{4} + \frac{1}{3} - \frac{1}{6} - \frac{1}{8} + \frac{1}{5} - \frac{1}{10} - \frac{1}{12} + \frac{1}{7} - \frac{1}{14} + \cdots = \frac{1}{2} \ln(2).$$



**Summary.** We visually compute the sum of a rearranged alternating harmonic series.

## References

- [1] Brouncker, W. (1668). The squaring of the hyperbola, by an infinite series of rational numbers, together with its demonstration. *Phil. Trans.* 3: 645–649. [doi.org/10.1098/rstl.1668.0009](https://doi.org/10.1098/rstl.1668.0009).
- [2] Hudelson, M. (2010). Proof without words: The alternating harmonic series sums to  $\ln(2)$ . *Math. Mag.* 83: 294. [doi.org/10.4169/002557010x521831](https://doi.org/10.4169/002557010x521831).

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