Math 181: Calculus II

Section 8.6: Alternating Series

Alternating series

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \frac{1}{32} + \cdots$$

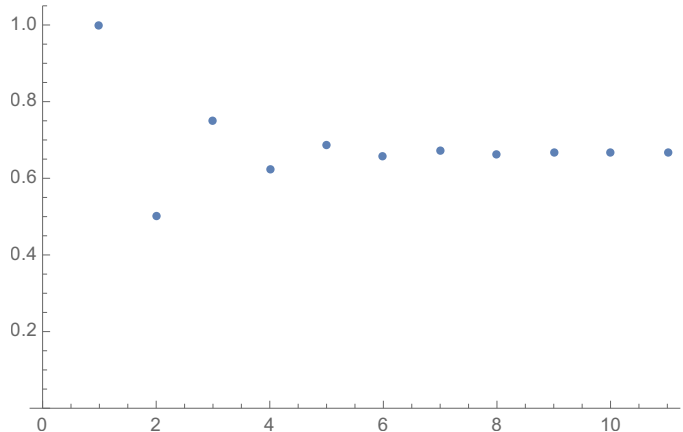
$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \cdots$$

Alternating series

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \frac{1}{32} + \cdots$$

Partial sums:

$$1,\ \frac{1}{2},\ \frac{3}{4},\ \frac{5}{8},\ \frac{11}{16},\ \frac{21}{32},\ \cdots$$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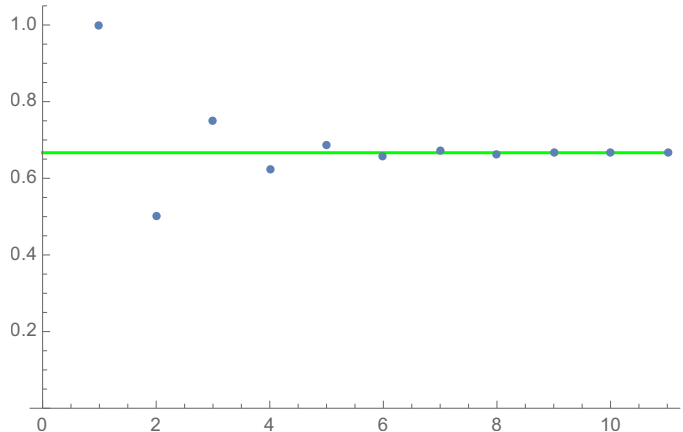
0.8
0.6
0.4
0.2
0
2
4
6
8
10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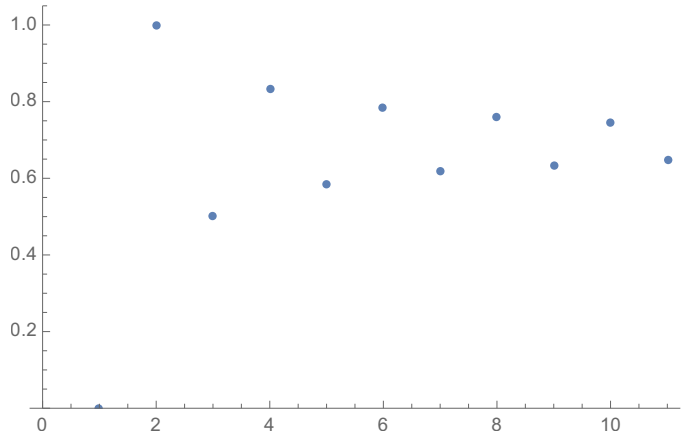
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0.8
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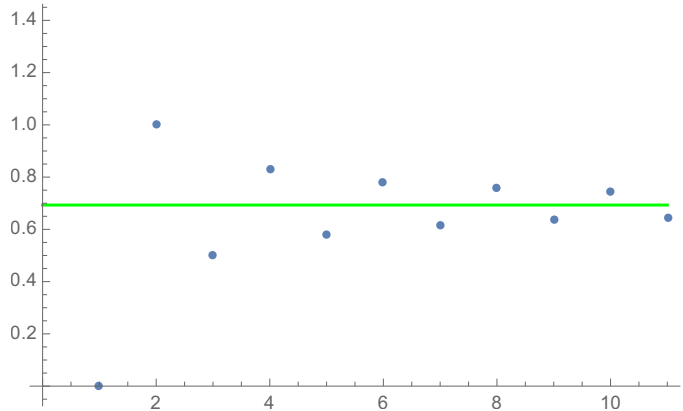
1.4
1.2
1.0
0.8
0.6
0.4
0.2
2
4
6
8
10

The alternating series test

If $\sum a_k$ is alternating, and $|a_k|$ is decreasing, then the series converges.

Warning!

- Changing the order of the terms can change the value!
- $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \cdots = \ln(2)$

Warning!

- Changing the order of the terms can change the value!
- $1 + \frac{1}{3} - \frac{1}{2} + \frac{1}{5} + \frac{1}{7} - \frac{1}{4} + \cdots = \frac{3}{2}\ln(2)$

Warning!

- Changing the order of the terms can change the value!
- $1 + \frac{1}{3} - \frac{1}{2} + \frac{1}{5} + \frac{1}{7} - \frac{1}{4} + \cdots = \frac{3}{2}\ln(2)$

`http://jdl.people.uic.edu/courses/m181f16/alternate.htm`