

Exercise 2

In exercises 1–10 determine whether the given sum over \mathbb{N} is convergent or not:

- * 1. $\sum_n \frac{1}{n^{1/2}}$
- * 2. $\sum_n \frac{1}{n^{3/2}}$
- ** 3. $\sum_n \frac{1}{n \ln n}$
- ** 4. $\sum_n \frac{1}{n \ln^2 n}$
- ** 5. $\sum_n \frac{\ln n}{n^2}$
- * 6. $\sum_n \frac{(-1)^n}{n}$
- ** 7. $\sum_n \frac{(-1)^n}{n^{1/2}}$
- ** 8. $\sum_n \frac{\cos n}{n}$
- *** 9. $\sum_n \frac{\tan n}{n}$
- ** 10. $\sum_n \sin n$

In exercises 11–13 determine whether the given sum over the primes is convergent or not:

- ** 11. $\sum_p \frac{1}{p \ln p}$
- *** 12. $\sum_p \frac{(-1)^p}{p}$
- *** 13. $\sum_p \frac{(-1)^p}{\sqrt{p}}$
- *** 14. Determine $\zeta(2)$.
- **** 15. Determine $\zeta(4)$.