4.6 Homework

Exercise 4.13 Determine whether the series with general term

$$\sum_{n=1}^{\infty} a_n$$

converges, where

$$a_n = \begin{cases} \dfrac{1}{2^n}, & \text{if } n \text{ is even,} \\ \dfrac{1}{2^{n+1}}, & \text{if } n \text{ is odd.} \end{cases}$$

Exercise 4.14 Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{4^n \, n! \, n!}{(2n)!}.$$

Exercise 4.15 Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{n!}{n^n}.$$

Exercise 4.16 Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{\sin n}{n}.$$

Exercise 4.17 Determine the nature (convergence or divergence) of the following series:

1. $u_n = \dfrac{n^3}{n!}$,
2. $u_n = \dfrac{\ln(n^n)}{(\ln n)^n}$,
3. $u_n = \dfrac{\sqrt[3]{n^4+1}}{n\sqrt{n-1}}$,
4. $u_n = \dfrac{1}{(\ln n)^p}$, with $n > 1$, $p > 0$,
5. $u_n = \dfrac{(-1)^{n+1}}{\sqrt{n}}$, with $n \geq 1$.