

**Exercise 1. Tests**

Decide which of the following series converge or not. Justify your decision!

(a)

$$\sum_{n=1}^{\infty} (-1)^n \frac{2}{\sqrt[4]{n} + 3}$$

(b)

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

(c)

$$\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^{n^2}$$

(d)

$$\sum_{n=0}^{\infty} \frac{\cos(n\pi)}{(\sqrt{3})^n}$$

(e)

$$\sum_{n=1}^{\infty} \frac{2^n}{n!}$$

(f)

$$\sum_{k=1}^{\infty} \frac{2^{2k} k^2}{e^k \cdot (k-1)!}$$

(g)

$$\sum_{k=1}^{\infty} \left( \frac{3k}{2k-1} - \frac{3k+3}{2k+1} \right)$$

(h)

$$\sum_{k=1}^{\infty} \frac{k!}{(3k)^k}$$

(i)

$$\sum_{k=1}^{\infty} \frac{k^{3k}}{3^{(k^2)}}$$

(j)

$$\sum_{k=1}^{\infty} \frac{\cos\left(\frac{k}{2}\pi\right)}{\ln(1+k)}$$