2

$$\sum_{n=1}^{\infty} \frac{1}{n\sqrt[n]{n}},\ a_n = \frac{1}{n\sqrt[n]{n}}$$

$$\lim_{n\to\infty} \sqrt[n]{n} = 1 : \lim_{n\to\infty} e^{\frac{1}{n}\ln n} = e^0 = 1\ a_n \sim \frac{1}{n}$$

$$\sum_{n=1}^{\infty} \frac{1}{n} \quad \sum_{n=1}^{\infty} \frac{1}{n\sqrt[n]{n}} \quad .$$

$$\sum_{n=2}^{\infty} \frac{2\cdot 5\cdot 8\cdot \ldots \cdot (3n-4)}{3^n \cdot n!}$$

$$\frac{a_{n+1}}{a_n} = \frac{(3(n+1)-4)\cdot 3^n \cdot n!}{3^{n+1}\cdot (n+1)!} = \frac{3(n+1)-4}{3(n+1)} = \frac{3n-1}{3n+3} = \frac{1-\frac{\frac{1}{3}}{n}}{1+\frac{1}{n}} = \left(1-\frac{1}{3n}\right)\left(1-\frac{1}{n}+O\left(\frac{1}{n^2}\right)\right) =$$

$$= 1-\frac{1}{n}+O\left(\frac{1}{n^2}\right)-\frac{\frac{1}{3}}{n}+\frac{\frac{1}{3}}{n^2}-O\left(\frac{1}{3n^3}\right) = 1-\frac{\frac{4}{3}}{n}+O\left(\frac{1}{n^2}\right) \{\ p = \frac{4}{3}$$

$\delta = 1$.

$$\sum_{n=2}^{\infty} \frac{1}{n\ln n},\ f(x) = \frac{1}{x\ln x}$$

$$f'(x) = -\frac{\ln x + 1}{x^2 \ln^2 x} = 0 \iff \{\ x \neq 0$$

$x \neq 1$

$x = \frac{1}{e} f(x) \quad x > 1$

$$f(n+t) \le a_n \le f((n-1)+t)$$

$$\int_n^{n+1} f(x)dx \le a_n \le \int_{n-1}^{n} f(x)dx$$

$$\int_2^{N+1} f(x)dx \le \sum_{n=2}^{N} a_n \le \int_1^N f(x)dx$$

$$\int \frac{1}{x\ln x}dx = \left[t = \ln x e^t = x dx = e^t dt\right] = \int \frac{e^t}{t\cdot e^t}dt = \int \frac{1}{t}dt = \ln t + C = \ln\ln x + C$$

$$\int_2^{N+1} f(x)dx = \ln\ln(N+1) - \ln\ln 2$$

$$\int_1^N f(x)dx = \ln\ln N - 0 = \ln\ln N$$

: $\ln\ln(N+1) - \ln\ln 2 \le \sum_{2}^{N} \frac{1}{n\ln n} \le \ln\ln N$