

1. $\lim_{n \rightarrow \infty} 2 \cos\left(\frac{n}{n^2+1}\right) =$

2. Let $a_n = \frac{3^n}{(n+2)!}$. Decide whether a_n is either increasing or decreasing - and if so, which.

3. $\sum_{n=2}^{\infty} \frac{3e^n}{\pi^{n+1}} =$

4. $\sum_{n=0}^{\infty} \arctan(n+2) - \arctan(n)$

(i) Which of the following has a chance to be convergent:

(a) $\sum_{n=1}^{\infty} (-1)^{n+1} n^{1/n}$

(b) $\sum_{n=1}^{\infty} (-1)^{n+1} \arctan n$

(c) $\sum_{n=1}^{\infty} (-1)^{n+1} \sin 1/n$

(ii) Argue why the series you chose converges

(iii) For the series you chose, what is an upper bound for the error if one used S_{100} , the 100-th partial sum to estimate the ~~sum~~ of the series?

(iv) Is S_{100} an overestimate or an underestimate of S ?