

Answer on Question #49121 – Math – Calculus:

use the ratio test determine whether the series converges or diverges $\sum_{n=1}^{\infty} \frac{5^n}{n!}$.

Solution.

Denote $a_n = \frac{5^n}{n!}$. Use the ratio test (i.e. D'Alembert criterion):

$$\frac{a_{n+1}}{a_n} = \frac{\frac{5^{n+1}}{(n+1)!}}{\frac{5^n}{n!}} = \frac{5^{n+1}n!}{5^n(n+1)!} = \frac{5}{n+1};$$

$$n > 4 \Rightarrow \frac{5}{n+1} < \frac{5}{4+1} = 1;$$

So the series is convergent.