408L CLASS PROBLEMS

APRIL 15TH, 2020

Problem 1. Use to ratio test to determine whether $\sum_{n=0}^{\infty} \frac{2^n}{n!}$ converges or diverges.

Problem 2. Use to ratio test to determine whether $\sum_{n=0}^{\infty} \frac{n^2+1}{e^n}$ converges or diverges.

Problem 3. Use the root test to determine whether $\sum_{n=0}^{\infty} \left(\frac{n^2+1}{2n^2+3}\right)^n$ converges or diverges.

Problem 4. Use the root test to determine whether the series $\sum_{n=0}^{\infty}(\tan^{-1}(n))^n$ and $\sum_{n=0}^{\infty}(\frac{\tan^{-1}(n)}{2})^n$ converge or diverge.

Problem 5. Let $1, 1, 2, 3, 5, 8, \ldots$ be the Fibonacci sequence, and let F_n be the nth Fibonacci number. In other words, $F_1 = F_2 = 1$ and $F_n = F_{n-1} + F_{n-2}$ for $n \geqslant 3$.

Determine whether the series $\sum_{n=1}^{\infty} \frac{1}{F_n}$ converges or diverges. (Hint: revisit Problem 3 from Day 22.)