

Practice Midterm 2
Math 253
February 27, 2024

You may use a hand-written sheet of notes.
Show your work where appropriate.
No calculators or cheating.

1. Does $\sum_{n=1}^{\infty} \frac{1}{n^2 \ln n}$ converge or diverge, and why?

2. Does $\sum_{n=1}^{\infty} \frac{1}{n^{2/3} + 1}$ converge or diverge, and why?

3. Does $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^{2/3}}$ converge absolutely, conditionally, or not at all?

4. Does $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$ converge or diverge, and why?

5. Find the fourth Taylor polynomial of the function $f(x) = e^{-x}$.

6. For which values of x does the series $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \cdots$ converge?