

You have 70 minutes.

No notes, books, calculators, computers, etc. are allowed.

Except where the instructions specifically preclude it, you may cite without proof any result discussed in class, the assigned textbook sections, or the assigned homework.

Show all of your work, in as organized a manner as possible. Incorrect answers with solid work often earn partial credit. Correct answers without explanatory work rarely earn full credit.

Perform as much algebraic simplification as you can. Do not bother to do non-trivial arithmetic. Mark your final answer clearly.

Good luck.

A. Find the interval of convergence of $\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} (2x)^{2n+1}$.

B. Using the root test, find a nonzero constant c such that $\sum_{n=0}^{\infty} \left(\frac{cn - 1}{n + 12} \right)^n$ converges.

C. Let $a_n = \sqrt[n]{n}$ for $n \geq 1$. Does the sequence $\{a_n\}_{n=1}^{\infty}$ converge? If so, then to what?

D. Does $\sum_{n=2}^{\infty} \frac{1}{n \log n}$ converge or diverge? (Explain. You may not simply cite the answer.)

E.A. Show that $\sum_{n=1}^{\infty} (-1)^n \frac{\sin^2(1/n)}{n^{9/2}}$ converges.

E.B. How much error do we incur, if we truncate the series after the 10th term?