Math 331 Homework: Day 36

Practice and Reading

Finish reading Sections 4.3.

1. Thinking about series tests:

a) nth term test (for divergence)—often not useful.

b) geometric series test—easy to spot when to use.

c) comparison test—usually compare to a p-series or possibly a geometric series.

d) p-series—easy to spot when to apply; use with comparison test.

e) ratio test—especially useful with factorials and nth powers.

f) root test—useful with nth powers, but ratio test is often a better choice.

Practice

1. Try this: Determine whether these series converge or diverge. Justify your answer by showing how the series satisfies the conditions of the test that you apply.

a) $\displaystyle\sum_{k=1}^{\infty} \frac{k+1}{12k+3}$ **b)** $\displaystyle\sum_{k=1}^{\infty} \ln\left(1+\tfrac{1}{k}\right)^k$ **c)** $\displaystyle\sum_{k=1}^{\infty} \pi^{-k}$ **d)** $\displaystyle\sum_{k=1}^{\infty} k^{-2/3}$ **e)** $\displaystyle\sum_{k=1}^{\infty} \frac{6k+2}{k^2}$

f) $\displaystyle\sum_{k=1}^{\infty} \frac{k^2}{2+k^5}$ **g)** $\displaystyle\sum_{k=1}^{\infty} \sqrt[k]{k}$ **h)** $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k!}$ **i)** $\displaystyle\sum_{k=1}^{\infty} \left(1+\frac{1}{k}\right)^k$

2. Determine whether these series converge or diverge.

a) $\displaystyle\sum_{k=1}^{\infty} \frac{k}{\sqrt{k^7+1}}$ **b)** $\displaystyle\sum_{k=1}^{\infty} \frac{(2k)!}{(k!)^2}$ **c)** $\displaystyle\sum_{k=1}^{\infty} \frac{k!}{2^k}$ **d)** $\displaystyle\sum_{k=1}^{\infty} \frac{3^k}{k^3}$