

11/2/09
• Lecture 9.6
• Practice

Prep for
Wednesday
• Read 9.7
• 9.4-9.6 HW
done

Friday
9.8
Power Series

Wed. 11/11 is
veteran's day ^{NO CLASS}
Fri. 11/13: out of
class assignment
due Mon. 11/16

9.6 (24)

$$\sum_{n=1}^{\infty} \frac{(2n)!}{n^5}$$

Ratio test:

$$a_n = \frac{(2n)!}{n^5}$$

$$a_{n+1} = \frac{[2(n+1)]!}{(n+1)^5}$$

Simplify $\frac{a_{n+1}}{a_n} = \left(\frac{(2n+2)!}{(n+1)^5} \right) \div \left(\frac{(2n)!}{n^5} \right)$

$$= \frac{(2n+2)!}{(n+1)^5} \cdot \frac{n^5}{(2n)!}$$

$$= \frac{(2n+2)(2n+1) \cancel{(2n)!} n^5}{(n+1)^5 \cancel{(2n)!}}$$

$$= \frac{(2n+2)(2n+1)n^5}{(n+1)^5}$$

So now...

$$\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \rightarrow \infty} \left| \frac{(2n+2)(2n+1)n^5}{(n+1)^5} \right| = \infty$$

Conclusion:

$$\sum_{n=1}^{\infty} \frac{(2n)!}{n^5}$$

diverges by the ratio test.