

Quiz 5, Calculus 2

⇒ give 15 minutes.

9:38

9:42

4

Name: Key

Determine whether each series is convergent or divergent. Explain your reasoning and state which test you use!

1. (4 points) $\sum_{n=1}^{\infty} (-1)^n \frac{4n+1}{3n-1}$
 a_n

$$|a_n| = \frac{4n+1}{3n-1}, \text{ and } \lim_{n \rightarrow \infty} \frac{4n+1}{3n-1} = \frac{4}{3} \neq 0$$

$$\Rightarrow \lim_{n \rightarrow \infty} |a_n| \neq 0$$

⇒

$\sum a_n$ diverges by the
Test for divergence

(Note that A.S.T does not work b/c $\lim_{n \rightarrow \infty} a_n \neq 0$).

2. (3 points) $\sum_{n=1}^{\infty} \frac{2+(-1)^n}{n\sqrt{n}}$

$$2+(-1)^n \leq 3 \quad \text{for all } n$$

$$\Rightarrow \sum \frac{2+(-1)^n}{n^{3/2}} \leq \sum \frac{3}{n^{3/2}} = 3 \sum \frac{1}{n^{3/2}}$$

converges b/c
p-series with
 $p = 3/2 > 1$

$$\Rightarrow \sum \frac{2+(-1)^n}{n^{3/2}} \quad \text{converges by comparison.}$$

3. (3 points) $\sum_{n=1}^{\infty} \frac{(-10)^n}{n!}$

Ratio test: $\left| \frac{(-10)^{n+1}}{(n+1)!} \right| \bigg/ \left| \frac{(-10)^n}{n!} \right| = \left| \frac{(-10)}{n+1} \right|$

$$\lim_{n \rightarrow \infty} \left| \frac{10}{n+1} \right| = 0 \Rightarrow$$

$$\sum_{n=1}^{\infty} \frac{(-10)^n}{n!}$$

converges
absolutely
by the
ratio test.