

Quiz #10b: Sections 9.1 & 9.2

Show all work to get full credit. Don't jump to conclusions.
If a limit does not exist, explain/show why. Leave answers in exact form.

Series

1. Determine whether the series converges or diverges. If it converges, find its sum.
If you use a convergence test, state which one you used.

8 pts.

$$(a) \sum_{n=1}^{\infty} 3 \left(\frac{1}{7}\right)^{n-1} + 5 \left(\frac{1}{2}\right)^{n-1} = \frac{21}{6} + \frac{20}{6} = \frac{41}{6}$$

★ Geometric Series $a=3, r=\frac{1}{7} \Rightarrow S_{\star} = \frac{3}{1-\frac{1}{7}} = 3 \cdot \frac{7}{6} = \frac{21}{6}$

∩ Geometric Series $a=5, r=\frac{1}{2} \Rightarrow S_{\cap} = \frac{5}{1-\frac{1}{2}} = 5 \cdot \frac{2}{3} = \frac{10}{3}$

Series converges to $\frac{41}{6}$

8 pts.

$$(b) \sum_{n=1}^{\infty} \frac{2n}{3n+1}$$

n^{th} -Term Test for Divergence

$$\lim_{n \rightarrow \infty} \frac{2n}{3n+1} = \lim_{n \rightarrow \infty} \frac{2}{3+\frac{1}{n}} = \frac{2}{3} \neq 0$$

Therefore, series diverges

Sequences

- 5 pts. 2. Determine whether the sequence converges or diverges. If it converges, find its limit.

$$a_n = \left(\frac{-5}{7}\right)^n \quad \left| \frac{-5}{7} \right| < 1 \quad \text{so} \quad \lim_{n \rightarrow \infty} \left(\frac{-5}{7}\right)^n = 0$$

Sequence converges to 0

3. Given the sequence $a_n = \frac{4n-3}{2^n}$

3 pts.

- (a) Write out the first 4 terms of the sequence.

$$a_1 = \frac{1}{2} \quad a_3 = \frac{9}{8}$$

$$a_2 = \frac{5}{4} \quad a_4 = \frac{13}{16}$$

6 pts.

- (b) Determine whether or not the sequence converges. Explain your answer.

$$\lim_{n \rightarrow \infty} \frac{4n-3}{2^n} = \frac{\cancel{4n}}{\cancel{2^n}} \\ \stackrel{\textcircled{L}}{=} \lim_{n \rightarrow \infty} \frac{4}{n2^{n-1}} = 0$$

Sequence converges to 0.

Points earned: _____ out of a possible 30 points