

Quiz #10a: 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)  $\sum_{n=1}^{\infty} 7 \left(\frac{-1}{3}\right)^{n-1} + 3 \left(\frac{1}{5}\right)^{n-1} = \frac{21}{4} + \frac{15}{4} = \frac{36}{4} = 9$

★ Geometric Series  $a=7$   $r=\frac{-1}{3} \Rightarrow S_{\star} = \frac{7}{1+\frac{1}{3}} = 7 \cdot \frac{3}{4} = \frac{21}{4}$

∩ Geometric Series  $a=3$   $r=\frac{1}{5} \Rightarrow S_{\cap} = \frac{3}{1-\frac{1}{5}} = 3 \cdot \frac{5}{4} = \frac{15}{4}$

Converges to 9

8 pts. (b)  $\sum_{n=1}^{\infty} \frac{5n}{7n+1}$

$n^{\text{th}}$ -Term Test for Divergence

$$\lim_{n \rightarrow \infty} \frac{5n}{7n+1} = \lim_{n \rightarrow \infty} \frac{5}{7+\frac{1}{n}} = \frac{5}{7} \neq 0$$

Thus, series Diverges

## Sequences

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

$$a_n = \left(\frac{-2}{3}\right)^n$$

$$\lim_{n \rightarrow \infty} |a_n| = \lim_{n \rightarrow \infty} a_n$$

$$\lim_{n \rightarrow \infty} \left(\frac{2}{3}\right)^n = 0 \quad \text{Therefore, sequence converges to } 0$$

3. Given the sequence  $a_n = \frac{5n-4}{3^n}$

3 pts.

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

$$a_1 = \frac{1}{3} \qquad a_3 = \frac{11}{27}$$

$$a_2 = \frac{6}{9} = \frac{2}{3} \qquad a_4 = \frac{16}{81}$$

6 pts.

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

$$\lim_{n \rightarrow \infty} \frac{5n-4}{3^n} = \frac{\infty}{\infty}$$
$$\stackrel{\text{L}}{=} \lim_{n \rightarrow \infty} \frac{5}{n3^{n-1}} = 0$$

Sequence converges to 0.

Points earned: \_\_\_\_\_ out of a possible 30 points