

NAME: \_\_\_\_\_

MATH 172, S 501 10/23/2019

Quiz 7

Show your work! You may not use calculators, notes or books.

(7pts)

1. Determine if the series below converges or diverges. In the case of convergence, find the exact limit of the series.

$$\sum_{n=1}^{\infty} 2^{2n} \cdot 5^{1-n}$$

$$= \sum_{n=1}^{\infty} 4^n \cdot 5^{1-n} = \sum_{n=1}^{\infty} 4 \cdot 4^{n-1} \cdot \frac{1}{5^{n-1}} = \sum_{n=1}^{\infty} 4 \cdot \left(\frac{4}{5}\right)^{n-1}$$

Geometric w/  
 $a=4, r=4/5$   
 $|r| < 1 \Rightarrow$  convergent.

$$= \frac{4}{1 - \frac{4}{5}} = \textcircled{20}$$

4pts. for  
bringing to  
this form

1pt. for  
stating  
geometric series

2pt. for  
limit

(3pts)

2. Suppose you have the series below:

(A)  $\sum_{n=1}^{\infty} ne^{2n}; \lim_{n \rightarrow \infty} a_n = \infty$

(C)  $\sum_{n=1}^{\infty} \frac{\cos(3n)}{n}; \lim_{n \rightarrow \infty} a_n = 0$

(B)  $\sum_{n=1}^{\infty} ne^{-2n}; \lim_{n \rightarrow \infty} a_n = 0$

(D)  $\sum_{n=1}^{\infty} \cos(3n); \lim_{n \rightarrow \infty} a_n = \underline{\underline{dne}}$

The Test for Divergence is **conclusive** for which of these series? (select/circle the correct option):

1). The Test for Divergence is conclusive for all the series above.

2). The Test for Divergence is conclusive only for A and B.

(3). The Test for Divergence is conclusive only for A and D. [3pts.]

4). The Test for Divergence is conclusive only for B and C.

NAME: Solutions

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Show your work! You may not use calculators, notes or books.

[7]

1. Determine if the series below converges or diverges. In the case of convergence, find the exact limit of the series.

$$\sum_{n=1}^{\infty} 3^{2n} \cdot 8^{1-n}$$

$= \sum_{n=1}^{\infty} 9^n \cdot 8^{1-n} = \sum_{n=1}^{\infty} 9 \cdot 9^{n-1} \cdot \frac{1}{8^{n-1}} = \sum_{n=1}^{\infty} 9 \cdot \left(\frac{9}{8}\right)^{n-1}$

③ for bringing to this form

Geometric w/  $a=9$ ,  $r = \frac{9}{8} \Rightarrow$  Divergent b/c  $\frac{9}{8} > 1$ .

① for stating geometric

③ for stating divergent

[3]

2. Suppose you have the series below:

~~A.~~  $\sum_{n=1}^{\infty} \frac{\sin(2n)}{n}$   $\lim_{n \rightarrow \infty} a_n = 0$

Ⓒ.  $\sum_{n=1}^{\infty} \sin(2n)$ ;  $\lim_{n \rightarrow \infty} a_n = \text{dne}$

Ⓑ.  $\sum_{n=1}^{\infty} ne^{3n}$ ;  $\lim_{n \rightarrow \infty} a_n = \infty$

~~D.~~  $\sum_{n=1}^{\infty} ne^{-3n}$ ;  $\lim_{n \rightarrow \infty} a_n = 0$

The Test for Divergence is **conclusive** for which of these series? (select/circle the correct option):

- 1). The Test for Divergence is conclusive for all the series above.
- 2). The Test for Divergence is conclusive only for A and B.
- 3). The Test for Divergence is conclusive only for A and D.
- Ⓓ. The Test for Divergence is conclusive only for B and C. [3pts]