## Topics: Series, Operations, and Computations with Series, Maclaurin, Taylor

## **SHOW ALL OF YOUR WORK AND highlight your answers. Note that an answer without supporting steps earns approximately 1/3 credit.**

1.) Find the first 5 terms of the sequence:  (n begins with zero)

2.) Find the sum of the finite geometric series:  Show all work.

3.) Give the first four terms (a0, a1, a2, and a3) of the sequence and then the first four terms of the infinite series for an = . write the infinite series in sigma notation.

4.) Circle the infinite series is/are convergent.

   

5.) Find the sum of the finite geometric series using your CAS SYSTEM: 

6.) Find the sum of the infinite geometric series, using the appropriate formula, accurate to 6 digits: 

7.) Find the first six partial sums of the following series and determine if it converges

or diverges.

 S1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 S3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S4 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 S5 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S6 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Convergent or divergent?

 Highlight the correct answer.

8.) Find the first six partial sums of the following series and determine if it converges

or diverges. 

 S0 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 S2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 S4 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S5 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Converge or diverge?

circle one

9.) Determine the Maclaurin Series for the following function: for n = 4

 Show all work.

10.) Enter and the series approximation from problem 9 into your CAS SYSTEM. Sketch the graphs.

For which values of x does the Maclaurin series approximation appear to converge for ?

 Interval of convergence = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11.) What would happen to the graph of the Maclaurin Series if the number of terms is increased?

12.) Use your CAS SYSTEM to find a Maclaurin Series approximation for where n = 6.

Maclaurin Series expansions

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13.) Use one of the expansions above to write the Maclaurin Series for 

14.) Use one of the expansions above to write the Maclaurin Series for 

15.) Use one or more of the expansions above to write the first 3 terms of the Maclaurin

 Series for . Hint: Use the first three terms from the relevant series and multiply.

16.) Use a Maclaurin series to approximate the value of the following: .

 Show the ‘Maclaurin integral’.

##### 17.) Calculate each value below using the Maclaurin series expansion. Then find the

#####  calculator value correct to 6 places.

#####  e0.5

 cos(1.57)

 ln(2.5)

18.) Why is it important that we be able to use series like the Maclaurin to approximate the

behavior of various functions? Under what circumstances would we prefer to use a

series approximation to model the behavior of a function rather than the function itself?

1. Is it possible to find a Maclaurin expansion for f(x) =  ? If yes, find the 3rd degree expansion. If not, explain why not.
2. Find the first five non-zero terms of the Taylor series expansion for f(x) =  , around the point *a* = 8, then use the terms of the series to find , accurate to 5 decimal places. Note that the correct answer is between 1.97 and 1.98.