

Math 8  
Fall 2019

Written Homework Day 4  
Assigned Monday, September 23

Note: Standard (not preliminary) written homework is graded on your work and your explanations, not just on your answer.

Explanations are important for many reasons. Being able to communicate what you know shows a depth of understanding beyond that of being able to get the right answer to a problem. Doing the mental work of putting explanations into words helps create that depth of understanding. On exams, we will grade your work and not just your answers, so this is good practice for taking exams.

For all these reasons, be sure to: show all your work; explain your reasoning; use clear English; write neatly so all this effort does not go to waste.

Written homework is always due at 10:00 AM on the following Monday.

1. The Taylor series centered at the point  $a = 1$  for the function  $f(x) = \ln(x)$  is

$$\sum_{k=1}^{\infty} (-1)^{k-1} \frac{(x-1)^k}{k}.$$

Use the ratio test to find the radius of convergence for this series.

2. Although the ratio test tells us that the series converges to *something* inside this radius of convergence, it doesn't tell us that it converges to  $f(x)$ . (For some functions, it does not.) Use Taylor's inequality to show that it does in this case for  $1 < x < 2$ . (Hint: Remember the written homework from Day 3. This is like the last part, except instead of  $x = 2$ , the number  $x$  could be anything between 1 and 2.)