

Math 8  
Winter 2020

Preliminary Homework  
Due Wednesday, January 15

Note: Preliminary homework is always graded credit or no credit. **You get full credit for completing the assignment, whether or not your answers are correct.** The purpose of preliminary homework is to start you thinking about the topic of the next class.

You may use your preliminary homework in activities with your classmates. You should be sure to think about these questions so you will be prepared.

Preliminary homework is always due at the *beginning* of class.

**Assignment:**

1. Recall that a geometric series is a series of the form  $\sum_{n=0}^{\infty} a_0 r^n$ . What should  $r$  be so that series converge? (The value  $r$  is the *ratio* of the series.)
2. The *limit of the ratio* of a series  $\sum_{n=0}^{\infty} a_n$  is the value  $\lim_{n \rightarrow \infty} \frac{a_{n+1}}{a_n}$ .  
What is the limit of the ratio of the series  $\sum_{n=0}^{\infty} \frac{n}{4^n}$ ?
3. Use the comparison test with a geometric series to show that  $\sum_{n=0}^{\infty} \frac{n}{4^n}$  converges.
4. Let  $\sum_{n=0}^{\infty} a_n$  be any nonnegative series (i.e. a series with all nonnegative terms), with the limit of the ratio being  $r$ . For what values of  $r$  do you think the series will diverge? For what values of  $r$  do you think it will converge?