

Professor Ken Ribet

Homework due Wednesday, September 28, 2016

1. Write the repeating decimal  $0.142857142857\dots$  as a geometric series and thereby identify the fraction whose decimal expansion is  $0.142857142857\dots$ .

2. Does the sequence  $a_n = \frac{\ln n}{n}$  converge to a limit? If so, what is the limit?

3. Show that the sequence  $c_n = (1 + \frac{1}{n})^n$  is an increasing sequence, i.e., that  $c_{n+1} \geq c_n$  for all  $n \geq 1$ .

4. Decide whether the infinite series  $\sum_{n=1}^{\infty} \frac{n}{n+2}$  is convergent? If it is convergent, can you find the sum?

5. Show that  $\sum_{n=1}^{\infty} \frac{1}{1 + \ln n}$  is divergent by comparing this series to another series that we know to be divergent.

6. Use the ratio test to decide whether or not  $\sum_{n=1}^{\infty} \frac{n^2}{2^n}$  is convergent.

7. Use the ratio test to decide whether or not  $\sum_{n=1}^{\infty} \frac{10^n}{n!}$  is convergent.