We will continue our exploration of the important notions of the lim sup and lim inf of a sequence. Then we will look at in greater detail the idea of a subsequence and that of a subsequential limit of a (possible divergent) sequence. En route we will check out the ideas of countable and uncountable sets; there may be a few surprises here.

There are a couple of specially important results this week. One is that every sequence, no matter how ugly it is, must have a monotone subsequence from which we deduce the famous Bolzano-Weierstrass Theorem that every bounded sequence has convergent subsequence. The other is Theorem 12.2 that will play a big role in our next topic, infinite series. And it has some curious consequences as a bonus.

Then, finally, we will just sort of dip a toe into our next business, the familiar study of infinite series. The main thing about this for us this week is a review of some of the main ideas and of geometric series.

Your specific assignment then is from Sections 11, 12, and 14 (through Example 2) from the Ross text from which you should tackle the following exercises:

§11  11.5, (11.7), 11.8, (11.9), 11.10;
§12  (12.5), 12.6, (12.7), 12.8, (12.9), 12.10, (12.13), 12.14;
§14  14.5, and

S1. For each of the following series write out its first four terms and decide whether or not it converges. If it converges, find its sum.

(a) \[ \sum_{n=0}^{\infty} \frac{2}{2^n} \]
(b) \[ \sum_{n=1}^{\infty} \frac{9}{10^n} \]
(c) \[ \sum_{n=1}^{\infty} \frac{\pi}{n^2} \]
(d) \[ \sum_{n=1}^{\infty} \frac{\sqrt{2n}}{n} \]