So we looked at the formal definition of what it means for a sequence to converge, but as a practical matter, how can we tell whether a given sequence converges or not?

There are two criteria that are the most commonly used for that purpose, and it's useful to be aware of them.

The first one deals with the case where we have a sequence of numbers that keep increasing, or at least, they do not go down.

In that case, those numbers may go up forever without any bound, so if you look at any particular value, there's going to be a time at which the sequence has exceeded that value.

In that case, we say that the sequence converges to infinity.

But if this is not the case, if it does not converge to infinity, which means that the entries of the sequence are bounded-- they do not grow arbitrarily large-- then, in that case, it is guaranteed that the sequence will converge to a certain number.

This is not something that we will attempt to prove, but it is a useful fact to know.

Another way of establishing convergence is to derive some bound on the distance or our sequence from the number that we suspect to be the limit.

If that distance becomes smaller and smaller, if we can manage to bound that distance by a certain number and that number goes down to 0, then it is guaranteed that since this distance goes down to 0, that the sequence, ai, converges to a.

And there's a variation of this argument, which is the so-called sandwich argument, and it goes as follows.

If we have a certain sequence that converges to some number, a, and we have another sequence that converges to that same number, a, and our sequence is somewhere in-between, then our sequence must also converge to that particular number, a.

So these are the usual ways of quickly saying something about the convergence of a given sequence, and we will be often using this type of argument in this class, but without making a big fuss about them, or without even referring to these facts in an explicit manner.