In this segment, we go through a quick review of a few properties of the Bernoulli process that we already know.

We start by thinking about the number of successes or arrivals in the first n time slots.

This is the following quantity.

At each time we add a 0 or a 1, depending on whether we've had a success or not, then by adding those numbers, we get the total number of successes.

Now we already know that the number of successes in n trials obeys a binomial distribution, so the probability of having k successes is given by the binomial probabilities.

And this is a formula that holds for k equal to 0 up to n, which are the possible numbers for the random variable S.

For this random variable, we know the expected value.

It's n times p.

And we also know its variance, which is n times p times 1 minus p.

Another random variable of interest is the time until the first success or arrival.

So this is defined to be the smallest i for which the random variable Xi is equal to 1.

We have done this calculation in the past.

The probability that the first success appears at time k is the same as the probability that the first k minus 1 trials resulted in 0's.

And then, the k-th trial resulted in a 1.

And so the probability of this is 1 minus p, the probability of 0, and we have k minus 1 of them, times p, the probability that the next trial gives us a success.

And this formula is valid for k being 1, 2, and so on, which is the range of possible values of this random variable T1.

This is the familiar geometric distribution that we have dealt with on several occasions.

And in particular, we know the expected value and the variance of the geometric random variable.