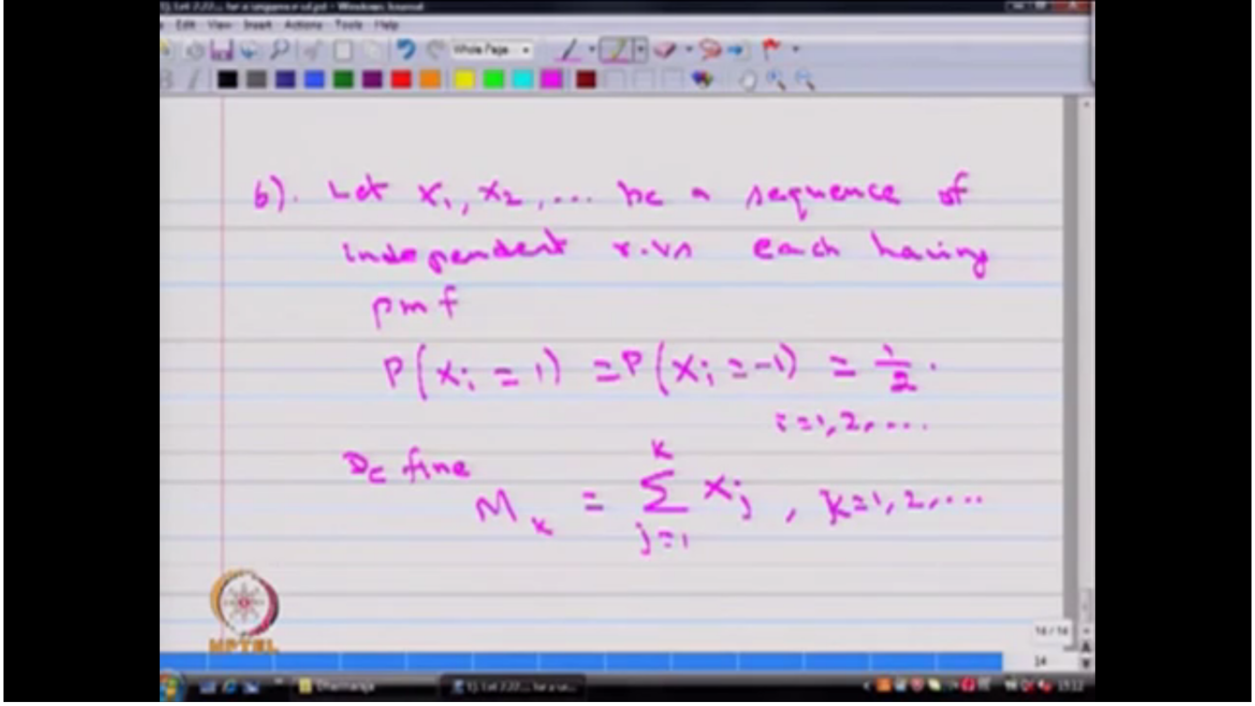
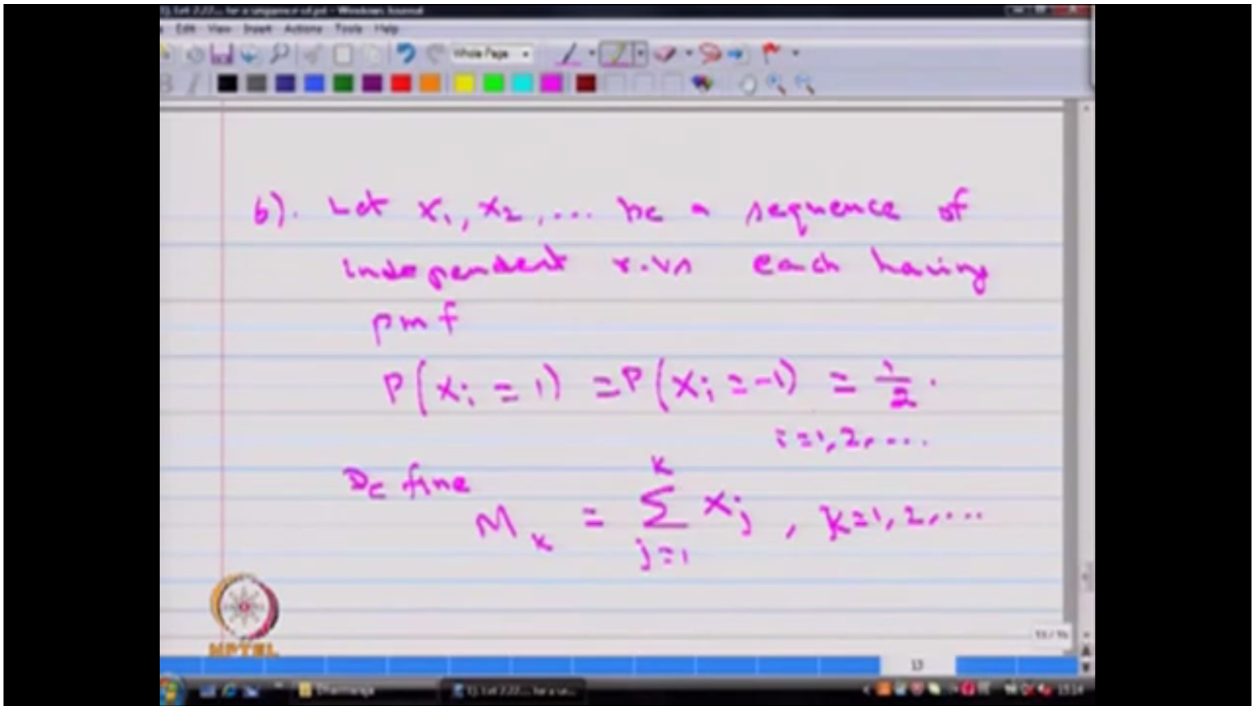


Now we move into next example, example 6. Let X1, X2 so on be a sequence of independent random variables each having probability mass function probability of Xi is equal to 1 that is same as probability of Xi takes a value minus 1 the probability is 1 by 2. This is valid for that means it's a sequence of iid random variables and they are discrete a type. Define M suffix K as the sum of first K Xi random variables. So this running index is K is equal to 1, 2, and so on. So we are defining a sequence of random variable MK by summing first K Xi random variables.

For a fixed integer n we define another sequence of random variable that is denoted by W superscript n of t that is nothing but 1 divided by square root of n M suffix n times t. This is for all t greater or equal to 0 such that n times t is an integer. So we are defining another sequence of random variables W superscript n of t that is 1 divided by square root of n time n of t where n of t is integer. So this is valid for all t greater or equal to 0.



If you find out the mean and variance for the difference of the random variable of n of t minus W n of s for 0 less than or equal to s less than or equal to t this quantity will be 0. That means Wn of t is 1 divided by square root of n M n of t and the way we define the Mn of t that is a summation of Xi's and the probability of Xi is equal to 1 and the probability of X is equal to minus 1 minus 1 is 1 by 2 therefore the mean of Xi's are going to be 0 because of that the expectation of or mean of Wn of t minus Wn of S that is equal to 0. Also if you evaluate the variance of Wn of t minus Wn of S by finding first variance of Xi's using that you find out the variance of Mn of t. Then find out the variance of Wn of t minus Wn of S that is going to be t minus S. it needs calculation of expectation of Xi's square then using expectation of Xi's square and the expectation of Xi's you can find out the variance of Xi's using variance of Xi's you can find out the variance of Wn of t. Then you find out the variance of Wn of t minus Wn of S. By using mean and variance for fixing fix t greater or equal to 0 as n tends to infinity we can conclude Wn of T tends to a random variable X and this convergence takes place in distribution using CLT one can conclude Wn of t converges to the random variable X and the convergence in distribution where X is normal distribution with the mean 0 and the variance T. Using central limit theorem one can prove W n of T converges to X in distribution where X is a normal distribution with the mean 0 and the variance t.

This result is very useful in Brownian motion and the same problem will be discussed in detail when we are discussing the model of Brownian motion.