Welcome to you students. In This module, we're going to discuss Unit 2 of Statistics , and Econometrics, and the module name is defining random variable.

The outline is as follows.First, we're going to define what is random variable, the types of random variable, probability distribution function, and a small calculation. Upon completion of this module, you'll be able to explain the meaning of random variable and to understand the probability distribution function. Now what is a random variable in probability and statistics are random variable is a variable whose value is subject to variation due to chance. That is randomness in mathematical sense as opposed to other mathematical variables. Random variable conceptually does not have a single fixed value, even if the value is unknown. Rather,it can take on a set of possible different values,each with an associated probability. Now if we look at random variable random variable, we essentially mean is any real number X which is associated with the outcome of a random variable. Now it can take any one of the various values with a definite probability. For example, in a throw of dice, ifX denotes the number obtain, then X is a random variable which can take values 123456 each with a probability of one 1.6 Y. Because each occurrence of each event is just one and the total number of outcomes is6 over here. So that is why the probability of getting one on the throw of 1 dice is 1 up on 6. Similarly, probability of getting two is also one up on 6, and likewise in like 4. So similarly, in a toss of coin,if X denotes the number of hits, then X is any random variable which can take any two values that is zero or one. That is, if we toss a coin, there is a probability of we not getting ahead or the probability of getting a one. So zero indicates probability of not getting ahead and one indicates probability of getting ahead. Similarly, if we want to find even number on a dice, then random variable X is any even number that appears on the dice, such as. 2, four and six.

Now we've looked at the types of random variables. We have two types of random variable. The First one is discrete random variable and the second one is continuous random variable. Now what is a discrete random variable? A discrete random variable can take on either offinite or at most a countably in finite set of discrete values.Now the probability distribution function is called as probability mass function, which directly Maps each value of the random variable to a probability. Now this has to satisfy two requirements. The first requirement is that every probability is a number between zero and one and the sum of all probabilities should be equal to 1. That is, probability of 1stevent. The 2nd event up to PP events should be equal to 1.

Now continuous random variable,on the other hand, takes on values that vary continuously within one or more real intervals an the distribution of a continuous random variable is called as cumulative distribution function that is absolutely continuous in nature.Now the resulting probability distribution of a random variable can be described by probability density, where probability is found by taking the area under the curve. Now we will look at probability distribution function. Now Probability distribution function is analogous to frequency distribution. Now, if we look at frequency distribution , frequency distribution takes into account total frequencies among different values. On the other hand, probability distribution it takes into account total probability of 1, which is being distributed among various values that the random variable can take. Now this following table shows us probability distribution where you have random variable X which is X one X2X3X4. X5 Uptill XN and we have the probabilities which is being associated with each random variable that is P1P, 2P3.So now if we look at the distribution function for both,the variable that is discrete and continuous, the distribution probability distribution function for discrete variable is called less probability mass function, and for continuous it is called less probability density function. So this shows the probability mass function of a discrete probability distribution where you have probabilities of all these single numbers and the associated probabilities right there. So for each random variable you have a fixed probability which is being mapped. Upon of distribution graph here and on the other

hand, we have this probability density function where this image shows probability density function for a continuous random variable and it is also called as the Bell curve and it is the most important continuous random distribution. And we will try to understand the probability distribution function by solving a sum.

So you have a calculation here,which is been given to you. That is, a dice is tossed twice,getting an odd number is termed as success. You asked to find the probability distribution of number of success here.

So since the case favorable of getting an odd number in that row of dice can be one, it can be 3 and it can be 5 because 1, three and five are odd numbers. So in total we have three possible cases of getting an odd number. So then our next step is to calculate probability of success.
So probability of success here is going to be. We have three possible outcomes of getting an odd number and the number of total outcome in a throw of dice is nothing but six. So we right here 3 upon six. What do we get here is 1.2, so the probability of success of getting an odd number in one throw of dice is nothing but one upon two, and we also have to calculate probability of failure, probability of failure is nothing but one minus the probability of success, which is nothing but one upon 2 again. Now, if X denotes the number of success in two throw of dice, then X is a random variable which takes on the values such as zero. 1N2Y0 indicates that in both the throw of dice there is no. There is no odd number that appeared. One indicates that on one of the guys you have an order number, which appeared an two indicates that on both the dice you have an odd number which appeared, so accordingly you have probability of X.

Which is being equal to zero.That is, random variable X equal to 0. How do you calculate that?Is probability of failure in the first attempt multiplied by probability of failure in the second attempt, which is equal to probability of failure is nothing but 1.2 and probability of failure again, which is 1.2, which is nothing but 1.4. Similarly, we take into account when probability of X, which is equal to 1. So here we take into account probability of success and failure in the first attempt plus probability of success and failure in the second attempt.So accordingly what we have is probability of success into probability of failure of the first attempt plus probability of success in the second attempt into probability of failure in the second attempt. So what do we get here is probability of success is nothing but 1.2. So which is 1.2 * 1.2, which is probability of failure right? Here again, we take into account for the second die, so probability of success again here is 1.2 into one upon two.

So after simplifying this, the final answer that we get is 1 upon to the third thing that we have to solve is for the odd number appearing on both the dice. So here what do we get here is probability of success,that is X which is equal to two, which is nothing but probability of success. In the first attempt. And probability of success in the second attempt. So what do we get here is probability of success in the first attempt into probability of success in the second attempt, which is half in half, which is equal to 1.4. So accordingly, for this particular variable that is an odd number, your distribution will look at.It will look at something like this 101 and two, so 40. It's Nothing but 1.44 probability equal to X is equal to 1. It is half an for two. It is 1.4so I hope you have understood this. The reference for this is fundamentals of Statistics by SC Gupta. Thank you, thank you.