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SPEAKERS

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So in the last clip, we're considering the CDF of the example that I gave you the clicker question, and we plotted its CDF. So I'm just going to go over it once more, in case any one of you still have doubts about that. So, so for this particular case, right, what we have is the CDF at this particular point. For example, at 10, the CDF is point 420 6.6 and 38.7. so on. So here is stem. So it's point four there, at 20. It's point 630. It's point seven, and so on. Right? Now, the question is, what about in between points, what about between 10 and 20? Now see, this X , if you're looking at the inbetween value, let's say 80, or 50, or so on, right, and you're looking at what's the probability that X tilde less than, say, 15. So the only possible value of X tilde, which can be below 15, is 10. Right? So even if you're considering if you're considering the probability that X tilde is less than or equal to 15, so this is the same probability as x tilde less than or equal to 10, because nothing is getting added in between, right, because there is no possible x still the values between 10 and 15. So that's why the CDF between 10 and 20. This is flat here, it's the same point for same thing, if you're looking at in between 20 and 30, nothing else has been added, because there is no other possibility between 20 and 30. So the CDF is flat there, right? But at 30, now you add the extra probability of point one, so it jumps up from point 6 point 7. Right, so it jumps up from here to here. And again, it is flat between 30 and 40. And the jumps up by 0.05, at 40, the jumps up there, and then it's flat here. And then it's flat here, and so and be on 60, which is the maximum possible value, that extra that can take, it becomes one and the other extreme, below 10, which is the minimum possible value that text can take is zero. So that's why this CDF in this case looks like what's called a step function. It looks like a stairs. So hopefully, that gives you a better grasp of why the CDF in this particular case looks like this stuff. So now let's, let's do how we can go from the CDF to the probability mass function. So so far, we have gone the other way. We started out with particular probabilities or critical points, and then we added them up to get the CDF. How can we call the reverse? Now, so the opposite is that start with a CDF? How do you get the probability mass function? Now, this is fairly easy to see the the CDF is this idea here, right? So if you're looking at CDF at the point x , that means you're adding up all the probabilities below it. Now, if you want to, if you look at the next value down for x , right, so let's call that x prime, right? And if we looked at the CDF there, it would be all the values up to here. Now, what's this extra bit here, this extra bit must be adding on because of the probability of X . So what that tells you is that if I take the

CDF at this point, and subtract it from the CDF at x prime, read the next value down of x , I should be able to get the probability of x . Right? So and that's exactly what we'll be doing in order to get the PMF from the CD So what we're going to do is just look at the difference between adjacent CDs. So what do we mean by that? Right? So see, if you look at this example, right, the way we got the CDF is point four, then we added this one, this became point six. And we added this point seven, that this point seven, five, and so on, right? Now, if instead, right, if I didn't give you this, and instead I gave you F_X , how can you get how can you get this, you just do the reverse. If you subtract this minus this, you'll get if you subtract this minus this, to get point one, if you subtract this point is this point two. So that's exactly the idea of how you can derive the probabilities from the CDF from the cumulative probability distribution. That cumulative is adding up up to that point. So if you subtract two subsequent ones, you're going to get the probability of each of those points. So again, if I didn't give you the P_X , right? If I just gave you the f of x , how can I get these probabilities, right? So this minus this, that's point two, that'll be the probability connected with 60. Right? Because that is the extra thing that I must have added on between this step and the step, right. Similarly, if I subtract point eight minus point two, seven 5.75, that's point two, five, that's exactly the probability here, because that is the extra thing that must have gone, tacked on to get the CDF. Similarly, for going from here to here, that's again, another 0.05 0.7 to 0.6. That's point 1, point 6 to point 4. That's two. And remember, the CDF below this minimal point right at zero. So if we go from point four minus zero, that's going to be point four. And that's given me the probability of this value, this value, this value of each of these paths. So if we subtract two subsequent two adjacent, X , the cdf of to adjacent x 's, right, this minus this, this minus this, this minus this, that will give me the probability connected with those. So that's the simple idea of how you can derive the probabilities, the probability mass function from the cumulative distribution. Let me do one more just to solidify this idea. So this was our example with the profits, right? So these were the different levels of profit possible profits. And this is the CDF connected with it. So if we now want to get what's the probability of getting a profit of exactly \$150, right? How can we get it from the CDF? It will be this minus that, that's 0.05? How can we get the probability of exactly getting a profit of 100, that will be this minus this, that's again 0.05. This one is this will be point two. So this is how you can derive the probability mass function from the city. So let me give you a clicker question just to again, make sure you have this idea down perfectly. So you will wish to stop the video at this point at trial. So hope you got a chance to do that clicker question what it asks it gives you a CDF and then asks you to find the probability mass at a particular point. So it asks for p of six, right? So it's looks - it asks you to find the probability connected with this six, right? So that must be this minus that. So one minus point seven, five, that must be equal to So the correct answer for that. So hopefully you were able to get the speaker question without too much difficulty. But again, let me reiterate, the basic idea is that you can go from, like, you can start with the probability mass function and build the CDF. Right? Or you can go vice versa. Let's start with the cumulative distribution function, and then recover from it the basic problem. And this idea, please do keep it in mind, because we're going to make heavy use of that. And that's going to be even more important when we do continuous random variables. So let me stop this clip here. And then I'll be introducing a new concept in the next clip.