Hello students, how are you all? I hope you all are fine and you must be preparing for your exams in a very good way. Today in this video we are going to see what is the meaning of Z test, how is Z test applied, what are the conditions or properties to apply Z test and what type of questions or topics can be covered under Z test or how can Z test be applied. We will talk about this in the next video. As we have read about complete T test, we will also talk about the concept plus different types of numericals, which four parts come out of which, how we can apply different formulas, all of them. Same to same as it is about Z test. So welcome to Gate Smashers, my name is Ankit Rodha, without any delay, let's start. First of all, you have to understand where does Z test actually apply, where does T test fail or where do the properties of T test go out. This is the first thing you have to understand. Or you can say that it goes out of the condition according to the question. Whatever question we will be given, we will have to recognize it, it will never be given in the maximum cases that T test has to be applied or Z test has to be applied. Now what is the condition like that? First of all, the first thing we are doing is that we have to set the null hypothesis and alternate hypothesis according to the question. For example, if a company claims that its life of the bulbs is 500 hours. So what will we say about this? H0, that is, what is the null hypothesis? Is equal to the mean that the company is claiming correctly and what will happen to H1 that the company is not claiming correctly. So we have to set the hypothesis in the T test of H0 and H1, which is our first step. After that, where will the Z test be applied? Z test will be done when the value of our sample or the value of n is greater than 30. What did we see? When our sample is picked smaller than 30, then we apply the T test. But if the sample is greater than 30, then which test will we apply? Z. Now Z test, the formula of Z. Z test means to get Z calculated. You understand calculated, right? Let's check two values, calculated and tabulated. So if we have to get the calculated value, then what will be its formula? X bar minus mu divided by sigma X bar. Where this is showing the mean of the sample or the mean of the sample. Say it as you wish. And mu is showing the mean of the population. The mean of the entire population will be given to us or something will be given that we can get out of it. First of all, the maximum will be given. What is this? This is your error. Now to get this error, as I told you earlier, to get the error where we had studied the standard deviation of sigma of X bar. Now there are two methods to get the error. Okay? Which are the two methods to get the error? The first method. Straight. The formula which we applied in the T test as it is. Standard deviation of the sample, sorry, standard deviation of the population divided by root n. Okay? Standard deviation by root n. You will apply this formula when we will be given the standard deviation of the population. The standard deviation of the population will be given. But in case if we are not given the standard deviation of the population, which is also a condition of the Z test. That the standard deviation of the population will be given to us from the beginning. You have read in the hypothesis. What was the difference between the T test and the Z test? Here the standard deviation is given and there it is not. But what I am telling you is that if the standard deviation is not given, then also you can work. How? If I have n greater than 30 or a large sample, then whom will you take? You will take the standard deviation of the sample. That is, s by root n. Then whom will we take? If the standard deviation of the sample is not given in case but the sample should be large. Next is set level of the signal. We used to set the level of significance. Like we did in the T test. That 1% is given or 2% is given. But if it is not given, then how much will we take it automatically? 0.05 or you can call it 5%. As it is, the formula changed from the same to same concept. Some conditions changed. After that, same step. If the calculated value comes less from your tabulated value, then our null hypothesis will be accepted. And your alternate hypothesis will be rejected. That is, the claim of the company is absolutely correct. But if it is more, especially if you put a mod here, we will check about the mod. The table I am providing you, you will find this table in the description under the link. The T table was separately in the file. Here it will work with this table. If 0.05 is given, then we will check. Is it two-tailed or one-tailed? It depends. I will tell you the question now. So if its mod. For example, the answer came minus 1.9. So according to the table, what are you doing? Its mod. That is, we will check 1.9. Whether 1.9 is smaller or bigger than them. So whatever calculated value you have taken out, if its mod is smaller than tabulated, then accept it. If it is big, then reject it. Then the alternate hypothesis will be accepted. That the company is claiming is wrong. Let's do it with a question. You will understand it very well. I am showing the question on your screen. It says. The sample of 500 produced. 500 bulbs produced is found to be 1600 R. That is, the sample of 500 bulbs was picked. What is the mean life of their mean life? Mean life is 1600 R. What does this mean directly? Listen carefully. How much is the value of n given to us? 500. Keep this in mind. We are not

given population but sample. 500 sample is given and its mean life is how much? Mean life is given to us. 1600 R. According to the question, this statement is made. Now it says. Next line is. With the standard deviation 200 R. Now whose standard deviation is given? The sample. That is, what is given to us is S. The standard deviation is 200. Next line is. Test the hypothesis that. Mean life of the bulb produced by the company is 1700 R. Against alternate hypothesis. Against. This means that mean life is greater than 1700. See, the first claim here. Understand this line. Read it again. Test the hypothesis that mean life of the bulb produced by the company is 1700. That is, H0. What is my null hypothesis? That is, it is saying that its mean life is 1700. Mean life is 1700. Against the alternative hypothesis that is greater than 1700. That means alternate hypothesis is given to us that mean life is not 1700 but more than that. Understand this statement. See, here it has given this statement. Now we are at 1% level of significance. That is, we have to check and show at 1%. So, the question is understood. Now one thing is a little unique here. That we will apply two-tailed test or one-tailed test. Till now we have seen two-tailed test in maximum cases. Here it has changed the case. H0. H1. Sorry. That is, more than 1700 R. I had told you in the hypothesis. When it comes more. That is, our mu is greater than whatever value it has given. So, which test do we apply? Right. Right-handed test. Or say one-tailed test. If I am talking about mode. If I am talking about mode. Then which test will be applied here? Right. That is, we will check the value of one-tail. Because from left to right. Here I have ignored it. I have given you the value of one-tail. And applied mode here. Now negative y or positive y answer will always be positive. So, according to this. Let's see the statement. Let's find out all the things. First of all. S by root n. What will we have? Our error. That is, we will get this value. S value is 200. And. Root of n. How much is n? 500. How much is n? 500. So, after solution. 10 to 10 is less than 20. Root 5 in 20y. Which is equal to 20 divided by root 5. And root 5 is 2.23. After solving. The answer that I have. 2.23 in 20y. 8.9 near about. So, its answer. How much I got? 8.9. Means. The value of our error has come. Now. Check the value of z. Z says. X bar. Means. The value given to you. Of its mean life. Minus. Mu. Population. Population. On which it is depending. Where is it talking about population? It is saying. It should be 1700. Of the whole data. This is given by the sample. The demand of the whole data is 1700. So, 1700. It is given by the sample. So, it is given by the sample. So, it is given by the sample. So, it is given by the sample. So, it is given by the sample. So, its value. 1700. Divide by. And how much we got this value? 8.9. So, the answer is. Minus 100. Divide by. Let us not make it 89. So, thousand by 89. Approximate answer will come here. Minus 11.2. Minus 11.2. And if we are talking about mode. We are talking about the calculated mode. So, what the answer will come to me? Positive. Because we are finding the mode. This value is here. Now. The answer is. The value given to us. Because the value given to us. We have to get it. How much? This value. Now. What will we get? What will we get? We will get. check the level of significance, it is 1% in case of 1% what is the value of one tail test? 2.33 this means that the calculated value is greater than less if the calculated value is greater than less then you will reject H0 and it will come back that means H1 is selected H1 alternate hypothesis is selected what was the demand of the question? what did it say? it said test the hypothesis that alternate hypothesis that is greater than 1700 at 1% that means our alternate hypothesis is accepted our H0 is not accepted here what does it mean in simple language? if it is accepted that means mean life 17 if it is accepted then it is more than 1700 because null hypothesis is rejected clear? so it is clear to you in the next video we will see the first use of Z test how to use it see you in the next video same time same place next day have a good day to all of you bye bye